Indian and Northern Affairs
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North of 60

Mineral Industry Report 1975

Northwest Territories
EGS 1978-5

MINERAL INDUSTRY REPORT
1975
NORTHWEST TERRITORIES
EGS 1978 - 5

By: P.J. Laporte, W.A. Gibbins, E.J. Hurdle,
C. Lord, W.A. Padgham and J.B. Seaton.

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CONTENTS

LIST OF FIGURES

LIST OF TABLES

INTRODUCTION

W.A. Padgham[1]
D.I.A.N.D., Geology Office, Yellowknife

This report describes mining and mineral exploration in the Northwest Territories (N.W.T.) during 1975. District Geologists monitored exploration during the year, one in each of four regions, the Keewatin, Arctic Islands, Mackenzie and Nahanni (Fig. I-1). A continued high level of activity in the Slave and Bear Structural Provinces required delegation of the Great Slave Lake District (Chapter IV) to the Arctic Islands District Geologist.

For the first time in this series on the N.W.T. we present the results of research into geological problems carried out in cooperation with Canadian universities. All such studies were financed mainly by contracts from the Department of Indian and Northern Affairs. Each report is presented as a separate chapter. It is expected that such reports will be a regular part of future Mineral Industry Reports (MIR). The staff of the Resident Geologist's Office have found the results of such contracts to be excellent value and trust that other Government and Industry people will concur with this view.

TABLE I-I

MINERAL CLAIMS AND REPRESENTATION WORK RECORDED

Year	Claims Recorded	Acreage	Work Recorded in $1,000
1962	3,922	202,571	395
1963	3,507	181,137	1,012
1964	5,718	295,335	1,065
1965	13,987	722,429	2,022
1966	20,200	1,043,330	2,813
1967	28,622	1,478,326	2,511
1968	44,489	2,297,857	4,811
1969	19,083	985,637	4,262
1970	14,574	752,747	3,990
1971	6,705	346,313	2,781
1972	5,555	286,916	2,237
1973	15,303	790,400	2,337
1974	12,180	629,097	3,192
1975	21,049	1,087,181	5,030

SUMMARY OF MINERAL EXPLORATION

The marked increase in exploration expenditures that took place in 1974 continued into 1975; 25 million dollars is estimated to have been spent, an increase of approximately 33% over 1974 and 250% over 1973 expenditures. These vastly increased expenditures were reflected in a great increase in the acreage under exploration. Over 21 thousand claims covering more than one million acres were recorded and 18 prospecting permits covering slightly more than three million acres were issued. This upsurge in activity is charted in Table I-I and II which were compiled by the staff of the Mining Recorders Office.

The expenditures of nearly eight million dollars reported for 1975 is only about a third of the total expenditures on mineral exploration and development. Significant amounts were also spent on reconnaissance prior to staking, on the staking of claims, on exploration of mining leases and in mine development. Staking of 21,000 claims probably represents an expenditure of nearly two million dollars. A number of property evaluations by extensive drilling expended significantly more monies than were reported for representation work credit. In view of these less well documented expenditures the 25 million dollar estimation is considered reasonable.

Annual expenditures on Prospecting Permits (Table I-II) which had reached more than three million during the uranium rush between 1969 and 1970 began to increase again in 1973 with the issuance of permits in areas considered favourable for base metals in the Arctic Islands, Cordillera and in the Slave Province. Further increases can be projected for the future as acquisition of permits for base metal possibilities are augmented by extensive permit acquisition for uranium exploration. The expenditures recorded on permits generally represents 80 to 90% of the actual expenditures as there is little advantage in not recording these because expenditures in excess of those required under the permit can be applied as representation work on any mineral claims staked within the permit area.

TABLE I-II

PROSPECTING PERMITS ACQUIRED AND EXPLORATORY WORK RECORDED ON PROSPECTING PERMITS

	No. of Permits			Area of Permits (1,000 acres)		Total Spent On Permits $1,000
Year	New	Lapsed	Total In Good Standing	New	Total In Good Standing	
1961	28	3	25	4,520	4,520	452
1962	8	14	19	1,371	3,010	465
1963	2	2	19	542	2,527	670
1964	-	10	18	1,551	2,552	474
1965	1	12	7	176	1,005	238
1966	8	2	13	1,544	2,048	330
1967	nil	10	3	nil	431	84
1968	17	nil	20	2,677	2,964	666
1969	103	11	112	18,020	18,876	2,998
1970	54	39	127	8,544	12,885	3,114
1971	41	54	114	5,152	7,742	1,747
1972	17	66	65	1,735	3,872	926
1973	19	35	49	3,349	4,657	1,171
1974	39	21	67	7,624	9,122	2,963
1975	18	19	66	3,099	6,786	2,846
Total 61-75	367	298	66	59,904		19,144

[1]Resident Geologist, DIAND

Figure I-I, District Geologist Regions 1975

Comparison of the distribution of staking and permit acquisition during the last four years (Table I-III) shows a number of interesting fluctuations. There were remarkable upsurges in staking in the Nahanni in 1973 and 1975 corresponding to lead-zinc and then copper exploration. Staking in the Mackenzie Mining District increased steadily and consistently whereas staking in the immense Arctic and Hudson Bay District has fluctuated as base metal interest in the Cornwallis lead-zinc play in 1972 was replaced by volcanogenic base metal exploration in the Keewatin Kaminak greenstone belt in 1973 and 1974. In 1975 the major staking resulted from the search for uranium.

Variations in Prospecting Permit acquisition follow the same pattern. In 1972 most permits were taken for lead-zinc in the Cornwallis Island District. The next year additional permits in the Cornwallis area were augmented by seven permits for lead-zinc in the Cordillera and six, mainly for base metals, in the Keewatin Region. In 1974 interest shifted strongly to uranium with 26 permits in the Baker-Thelon area of the Keewatin and four in the northern Bear Province. Interest in Slave Province base metals was reflected in five permits acquired on Archean volcanic belts.

In 1975 there were only 18 Prospecting Permits issued and 9 of these were for uranium possibilities in the Keewatin. Three were for base metals in the Cordillera, and three for base metals in the Keewatin. One Permit in 1975 was presumably for base metals in the northern Slave Province, and two permits were acquired on a large gravity anomaly near the Arctic

Coast in the Interior Platform.

TABLE I-III

GROUND ACQUISITION 1972 TO 1975

MINING DISTRICT	CLAIMS STAKED			
	1972	1973	1974	1975
Arctic and Hudson Bay	2,022	4,386	1,218	5,315
Mackenzie	2,940	7,158	10,026	10,370
Nahanni	543	3,304	936	5,364

REGION OR GEOLOGICAL PROVINCE	PERMITS ISSUED			
	1972	1973	1974	1975
Arctic Islands	10	5	2	-
Bear and Slave Provinces	3	1	9	1
Cordilleran Province	3	7	-	3
Keewatin Region	1	6	28	12
Interior Platform	-	-	-	2

A number of important programs were underway in the Keewatin, in the Bear and Slave structural provinces, and in the Cordillera. New life was injected into the Pine Point area, where Western Mines acquired and began to explore a large block of ground extending westerly from the boundary of the Pine Point Mines property.

The Arctic Islands were relatively quiet but Keewatin uranium exploration revived as Cominco Ltd. explored Pan Ocean Ltd.'s holding south of Baker Lake. Further south St. Joseph Explorations Limited drilled the Gemex massive sulphide body and Noranda, U.S. Steel, Hudson Bay Exploration, Cominco and Aquitaine explored the Kaminak Volcanic Belt.

Exploration for volcanogenic base metal deposits continued apace in the Slave Province volcanic belts where Cominco Ltd., Conwest-Brascan, and Texasgulf drill tested significant deposits in the Hackett River Area and at Izok Lake. Airborne EM and magnetic surveys of the northern volcanic belts were followed by extensive staking.

Base metal prospects were drilled in the East Arm Subprovince and in the Bear Province, just east of Hornby Bay. Silver prospects continued to attract attention in the Great Bear Lake area, and at least eight gold properties were explored in the Slave Province.

Base metals were the main target in the Nahanni Region where over 5,000 claims were staked along the Redstone Copper Belt. Many companies continued to test lead-zinc showings in the carbonates of the Mackenzie Mountain Belt. Rio Tinto was working in Helikian carbonates in the Gayna River area where lead and zinc showings reportedly of 'Mississippi-Valley Type', are associated with large stromatolite reefs. Canex Placer and U.S. Steel continued work on shale-hosted lead-zinc in the Howard's Pass area.

SUMMARY OF MINING

Seven mines operated in the N.W.T. in 1975. Gold, silver, copper, lead, zinc and tungsten, worth nearly 195 million dollars, were produced. Small amounts of bismuth and cadmium contained silver and zinc concentrates were also produced.

Figures for total employment in the mineral industry are not available but in 1975 there were 1,583 people working in producing mines and a considerable number employed in mine construction at Cantung and Nanisivik and a few employed in standby and maintenance at non-operating mine sites. In addition, a large work force was employed seasonally in minerals exploration and geological survey work. Estimates suggest at least 1,500 persons were engaged for part of the year in exploration but in some cases the people involved spent only a week or two in the N.W.T. Mining thus continued to be the major private sector employer and the major producer of new wealth in the N.W.T. Mining is far more important to the N.W.T. economy than it is to any of the provinces because nearly $4,700 in contained metals is produced for each inhabitant and this is roughly 20 times the Canada wide average of $250 per inhabitant. However, because most of the smelting and refining is done in southern Canada or abroad, a major part of the economic effect of this production is not felt in the N.W.T.

One mine, Nanisivik, was being prepared for production to commence in 1976, the Hope Bay Mine ceased production after a short life, and Northrim Mining continued desultory efforts to achieve permanent operation. Echo Bay Mine resumed operations on a clean-up basis early in the year and by year end had transferred most mining activity to the nearby Eldorado Mine, previously a silver-radium-uranium producer.

Details on each producing mine including production, reserves, development and exploration are presented in Chapter VII.

ACTIVITIES OF THE NON-RENEWABLE RESOURCES SECTION, INDIAN AND NORTHERN AFFAIRS 1975

The Department of Indian and Northern Affairs administers the non-renewable resources of the N.W.T. The Non-Renewable Resources Section in Yellowknife consists of four sections, the offices of the Regional Oil and Gas Conservation Engineer, the Regional Mining Engineer, the Resident Geologist, and the Mining Recorder. Since early 1976 all mining recording activities, with the exception of the supervision of Prospecting Permits, have been concentrated in Yellowknife where the Mackenzie Mining District, Nahanni Mining District and Arctic and Hudson Bay Mining District Mining Recorders work under Supervising Mining Recorder, R.L. Williams.

In mid 1975, R.W. Hornal became Assistant Regional Director for Non-Renewable Resources, and W.A. Padgham became Resident Geologist.
C.W. Jefferson became acting Project Geologist and supervised the completion of the Hackett River Mapping Program, where NTS 76 F/9, F/15, F/16 and 76 K/1 and 2 were mapped. Preliminary maps for these areas were released early in 1976. Dr. R.A. Frith of the Geological Survey of Canada began mapping in the

Hackett River Area in 1975 and completed work there in 1976. Preliminary reports of his work with summary of the results of DIAND's Hackett Program have been published in the Report of Activities (Frith and Hill, 1975; Frith et al., 1977). Detailed mapping by D. Bryan immediately south of the headwaters of the Hackett River was used as the basis of a Masters thesis at the University of Alberta. A summary account of this work is presented here as Chapter IX.

C. Lord joined the section as Nahanni Region District Geologist in July and worked with J.D. Murphy, acting, for the summer, as Nahanni District Geologist.

F. Krause of the University of Calgary began a study of the Sekwi Formation in the Mackenzie Mountains. A summary of this work, the field component of which was completed in 1977, is included in this report as Chapter XI.

In the Keewatin S. Leggett and K. Barrett mapped the Archean Kaminak Group volcano-sedimentary assemblage in the Heninga Lake area (65 H/16). With P. Laporte, they also mapped gneisses of Archean age at Ferguson Lake (65 I/15).

A number of other research projects were assisted by contracts through the Resident Geologist's Office or the Geological Services Unit in Ottawa. Mr. S.P. Goff of the University of Alberta worked on the volcanic rocks of the East Arm under the supervision of Dr. Chris Scarfe. A summary of their work is presented as Chapter VIII.

Logistical support was provided to Mr. C.W. Stanworth and Dr. J.P.N. Badham of the University of Southampton for studies of the sandstone-hosted uranium deposits of the East Arm, and of the metallogeny of the East Arm.

Investigations of soapstone localities on southern Baffin Island were done by Dr. D.D. Hogarth of the University of Ottawa under contract. Professor Hogarth visited 17 soapstone localities and reported on 25 unvisited locations. Logistical support was provided to a Territorial Government project headed by Mr. B. Renneberg who visited and mapped eight soapstone localities in the Baker Lake district. Results of this work as well as a listing of most soapstone sources known in the N.W.T. (Murphy 1973) are available as open file reports in the Resident Geologist's Office in Yellowknife.

A considerable number of open file geological reports have been prepared for distribution through the Resident Geologist's Office. Although many have been superceded by later work, or may be out of date by now, some readers may be unaware of their existence and therefore they are listed below.

The Resident Geologist's Office provided an expediting service out of Yellowknife for various university groups and for at least eight Geological Survey crews operating mainly in the Bear and Slave Structural Provinces. A few other Federal Government groups were assisted including one from Parks Canada, at least one from the Surveys and Mapping Branch and one from the Earth Physics Branch. A radio schedule was maintained every evening at 7.00 p.m. as part of this service which was administered in 1975 by Mr. Max Braden of Yellowknife.

FORMAT AND ACKNOWLEDGEMENTS

There are eleven chapters in the report. The author of each section is given on the first page and in the table of contents. Reference to this report should be made to the author of the individual section of interest as in: Laporte, P.J., Mineral Industry Report 1975, Northwest Territories, Chapter II, the Keewatin Region. EGS 1978-5.

Most sections were written totally by one person but the Mackenzie Region Report, Chapter V, which contains nearly half of the total descriptions has otherwise unacknowledged input from Staff Geologist E.H. Hurdle, Archivist R. Simon, Research Assistant Ken Carriere and District Geologist C. Lord. Editing has been the responsibility of W.A. Padgham and P.J. Laporte. Most of the drafting is by Mr. A. Dusseault and Mrs. K. Bannister of the DIAND Drafting Section.

Minor variations in organization from region to region will be apparent in this report, this has been allowed in order to facilitate production of a report that would best fulfill the needs of the regions as recognized by the District Geologist involved.

The title or introductory section gives the name of the group, company or persons doing the work. If this is not the claim owner, that may be noted in *HISTORY* or in some cases, where the change was made in 1975, in *CURRENT WORK*. Location, when convenient, is given by National Topographic Sheet (NTS) number, by latitude and longitude and under *LOCATION* by reference to local topography and distance from a major centre. As most names in use have not been approved by the Topographic Board, we have not attempted to differentiate these in any way.

REFERENCES are given to the most current regional and detailed published geological maps and reports. Properties have been grouped in districts where locations, histories, references and geological situation are similar, and thus some general references appropriate to various properties will be given only in the description of the district.

HISTORY describes the past work on the claim, or earlier staking of the ground where this is known. The *DESCRIPTION* gives the local, and in some cases, regional geology and the economic geology of showings or deposits if known from non-confidential sources.

CURRENT WORK AND RESULTS deals with 1975 work on various claims and permits but in some cases regional reconnaissance has not been directly connected with mining properties, so these cannot be listed. As current work and results has been verified by reference to assessment work records which may not be open to public scrutiny until late 1978, or in some cases 1979, all write ups have been submitted to the companies who did the work to be sure that disclosures of confidential data would not occur.

Walter A. Gibbins' work in the Arctic Islands was assisted invaluably by Polar Continental Shelf logistical support.

LIST OF PUBLICATIONS ON THE N.W.T. AS OF JANUARY, 1978 BY EXPLORATION AND GEOLOGICAL SERVICES UNIT, D.I.A.N.D.

Mineral Industry Reports

Mineral Industry Report, 1969-70, Vol. 2, Northwest Territories, east of 104° west longitude; by P.J. Laporte, 1974 $ 2.00

Mineral Industry Report, 1971-72, Vol. 2, Northwest Territories, east of 104° west longitude; by P.J. Laporte, 1974 $ 2.50

EGS 1975-8 Mineral Industry Report, 1971-72, Vol. 3, Northwest Territories, west of 104° west longitude; by W.A. Padgham, M.M. Kennedy, C.W. Jefferson, D.R. Hughes and J.D. Murphy. $ 3.00

EGS 1976-9 Mineral Industry Report, 1973, Northwest Territories; by W.A. Padgham, J.B. Seaton, P.J. Laporte and J.D. Murphy. $ 3.75

EGS 1977-5 Mineral Industry Report, 1974, by W.A. Gibbins, J.B. Seaton, P.J. Laporte, J.D. Murphy, E.J. Hurdle, W.A. Padgham. $ 4.50

In Press

Mineral Industry Report, 1969-70, Vol. 3, Northwest Territories, west of 104° longitude.

Geological Maps and Reports

Preliminary geology map of Camsell River Silver District, scale five inches to one mile; by R.J. Shegelski and J.D. Murphy; G.S.C. Open File 135, 1973. $ 3.50

Preliminary geology map of Rainy Lake, N.W.T., 86 E/9, scale 1:31,680; by J.D. Murphy; G.S.C. Open File 135, 1973. $ 1.00

Preliminary geology map of Rankin Inlet, 55 K/16, scale 1:31,680; by P.J. Laporte and S.K. Frape; G.S.C. Open File 179, 1973. $ 1.00

Preliminary geology map of White Eagle Falls, N.W.T., 86 F/12, scale 1:31,680; by W.A. Padgham; G.S.C. Open File 199, 1974. $ 1.00

Preliminary geology map of High Lake, N.W.T., 76 M/7, scale 1:31,680; by W.A. Padgham; G.S.C. Open File 208, 1974. $ 1.00

Geology of Two Base-Metal Deposits (High Lake and Indian Mountain deposits) in the Slave Structural Province; by W. Johnson; G.S.C. Open File 239, 1974. $ 4.00

Lake-sediment geochemical sampling survey in the following areas: Yellowknife, Indin Lake and portions of the Cameron River and Beaulieu River, Greenstones Belts. Consists of: report and 14 maps showing sample locations and values, regional geology and mineralised localities; by D. Nickerson; G.S.C. Open File 129, 1972. $12.00

EGS 1975-1, 1975-2, 1975-3 Preliminary geology maps of Hackett River, 76 G/13, G/12, G/5 (part) scale 1:31,680; by W.A. Padgham, M.P.D. Bryan, C. Jefferson, E.A. Ronayne and V.Z. Sterenberg. $ 2.00/map

EGS 1976-4, 1976-5, 1976-6, 1976-7, 1976-8 Five preliminary geology maps of Hackett River, 76 K/2, F/9, K/1, F/15, F/16, scale 1:31,680; by C.W.Jefferson, W.A. Padgham, M.P.D. Bryan, R.J. Shegelski, E.A. Ronayne, H. Vandor and L. Thorstad. $ 2.00/map

EGS 1976-1 Preliminary geology map of Heninga Lake, 65 H/16, scale 1:31,680; by K.R. Barrett and S.R. Leggett. $ 2.00

EGS 1976-2 Preliminary geology map of Ferguson Lake, 65 I/15, scale 1:31,680; by K.R. Barrett, P.J. Laporte and S.R. Leggett. $ 2.00

EGS 1976-3 Preliminary geology report of Baker Lake, 56 D/2 (part), D/7 (part), includes surficial and bedrock geology maps, scales 1:15,840 and 1:1,000; by K.R. Barrett, P.J. Laporte and S.R. Leggett. $ 2.00

EGS 1976-17, 1976-18 Preliminary geology maps of Takijuq Lake, 86 I/1 and 86 I/2, scale 1:31,680; by R.S. Hyde, H.A. McLeod, B.T. Scribbins and S. Taylor $ 2.00

EGS 1978-1 Preliminary geology map of Amer Lake, 66 H/7, scale 1:31,680; by P.J. Laporte, K.R. Barrett and G.Schwab.

EGS 1978-2 1977 Exploration Activity in the Keewatin District. One index map and eight maps outlining the geology and property ownership in seven active areas of the Keewatin. Prepared by P.J. Laporte for presentation at the December 8, 1977 Geoscience Forum in Yellowknife.

EGS 1978-4 Preliminary geological maps of NTS 86 H/14, 15 and 16, scale 1:31,680; by A.F.S. Bau, L. Aspler and E. Hurdle.

In Preparation

Copies of these manuscripts can be examined at the Resident Geologist's Office, Yellowknife

Geological compilation of Beniah Lake, 85 P/8, scale 1:31,680.

Preliminary geology map of Turquetil Lake, 55/13 and Carr Lake, 55 L/4, scale 1:31,680/ An updated and revised edition of EGS 1976-1, geology map of Heninga Lake 65 H/16, scale 1:31,680; compiled by P.J. Laporte.

Miscellaneous Studies

The following preliminary reports are on open file at the Resident Geologist's Office in Yellowknife, N.W.T. and Whitehorse, Y.T.

The Geochemistry of Lake Sediments in the Yellowknife River Area, N.W.T.: by Robert G. Jackson, Department of Geological Science, Queen's University, May, 1973. $ 6.00

Coal Deposits in the Arctic Archipelago, N.W.T., by T.W. Caine, 1973. $ 2.00

Coal Occurrences of the Western Mainland of the Northwest Territories, by J.A. Goodwin $ 2.00

Soapstone Deposits of the N.W.T.; by J.D. Murphy, 1973. $ 5.00

Mineral occurrence overlays for geological maps of various parts of the N.W.T. show most mineral showings reported for the various areas. These sheets are updated at irregular intervals. Costs are $1.00/sheet paper and $2.50/sheet transparent mylar.

As of January, 1978 sheets are available for most of NTS 75, 76, 85, 86 and parts of 77, 87, 95, 96, 105 and 106.

Papers

Copies of the following papers are available free of charge from the Resident Geologist's Office in Yellowknife.

Exploration for Lead-Zinc in the Selwyn and Mackenzie Mountains, Yukon and Northwest Territories; by J.D. Murphy and W.D. Sinclair. Paper presented at the Prospectors and Developers Association Convention, Toronto, Ontario, 1974.

Mineral Potential of the Northwest Territories; by W.A. Padgham. Published in the Geology of Canadian Arctic. Editors; J.D. Aitken and D.J. Glass. Special publication of the C.S.P.G. and G.A.C., 1974.

Lead-Zinc Mineralisation in the Central Dolomite Belt of the Lower Cambrian Sekwi Formation; by W.J. Crawford. Paper presented at Geoscience Forum, Yellowknife, N.W.T., 1974.

Lake Sediment Geochemistry as a Guide to Detection of Massive Sulphide Deposits in the Southern Slave Province; by R. Jackson and I. Nichol. Paper presented at Geoscience Forum, Yellowknife, N.W.T., 1974.

Highlights of Mining Exploration in the Northwest Territories, 1974; by R.W. Hornal. Paper presented to Prospectors and Developers Convention, March 1975.

Preliminary Summary of Mineral Exploration in the Northwest Territories, 1975; by the staff of the Resident Geologist's Office, D.I.A.N.D., Yellowknife, N.W.T.

Preliminary Summary of Mineral Exploration in the Northwest Territories, 1976; by staff of the Resident Geologist's Office, D.I.A.N.D., Yellowknife, N.W.T.

Exploration Overview Northwest Territories, 1977; by staff of the Resident Geologist's Office, D.I.A.N.D., Yellowknife, N.W.T.

Reports

Available only from:

Exploration and Geological Services Unit,
Northern Natural Resources and Environment Branch
D.I.A.N.D.,
Ottawa, Ontario K1A OH4.

Mines and Mineral Statistics, North of 60 (published monthly and includes claim staking and production statistics for Yukon and Northwest Territories).

Mines and Minerals Activities, North of 60 (published yearly and includes summaries of exploration and mining activities for Yukon and Northwest Territories).

KEEWATIN REGION

P.J. Laporte[1]
D.I.A.N.D., Geology Office, Yellowknife

In 1975 the District Geologist, Keewatin Region, monitored mineral exploration in the District of Keewatin and on Melville Peninsula. This area, part of the Churchill Structural Province of the Canadian Shield, is underlain by Archean and Aphebian volcanic, sedimentary and plutonic rocks deformed and metamorphosed during the Hudsonian Orogeny. Shallow-dipping to flat-lying unmetamorphosed rocks of late Aphebian and Helikian age locally overlie the metamorphic complex south and west of Baker Lake.

In the following chapter the Keewatin District has been subdivided into three regions on the basis of geology and exploration targets (Fig. II-1): the Ennadai Lake - Rankin Inlet Area, the Baker Lake - Thelon River Area, and the Chantrey Inlet - Wager Bay Area. Most of the properties in the district and on Melville Peninsula encompass, or are adjacent to lakes on which fixed-wing aircraft can land.

ENNADAI LAKE - RANKIN INLET AREA

The Ennadai Lake - Rankin Inlet Area is underlain by a complex of granitic gneisses, migmatites and intrusions enclosing northeast-trending belts of volcanic flows and pyroclastics, slate, greywacke, conglomerate and minor iron-formation. These Archean volcanic and sedimentary rocks are unconformably overlain by Aphebian conglomerate, greywacke, quartzite and orthoquartzite, argillite and dolomite which, to the east, are interbedded with and overlain by balsaltic flows. During the Hudsonian Orogeny, the Aphebian strata and the Archean rocks were folded about northeasterly axes and intruded by quartz monzonite and granodiorite. Fluorite-bearing granite intruded the Archean-Aphebian complex during Paleohelikian time.

Volcanogenic massive sulphide deposits within the Archean volcanic-sedimentary assemblage are the main target of mineral exploration in this area. A gold deposit in Archean iron-formation at the southwest end of the main supra-crustal belt is under development.

MAGUSE LAKE - WALLACE RIVER PROJECT

Aquitaine Company of Canada Ltd. 55 D,E,F,K; 65 H
2000, 540 Fifth Avenue S.W.,
Calgary, Alberta.

REFERENCES
Davidson (1970b); Gibbins *et al.*,(1977); Ridler and Shilts (1974); Wright (1967).

PROPERTY
The Maguse Lake - Wallace River Project explored the six prospecting permits and 38 claim groups listed in Figure II-2.

LOCATION
The area studied extends east and northeast from Ray and Carr Lakes to Dawson Inlet (Figure II-2).

HISTORY
Four prospecting permits and 87 claims were acquired in 1973 and the remainder in 1974 (Gibbins *et al.*, 1977). The 170 ACO, 9 GAB, 9 KOP and WEX 5-7 claims were staked in 1975.

DESCRIPTION
The Maguse Lake - Wallace River Project investigated the base-metal potential of the southern part of the northeast end of the Rankin - Ennadai greenstone belt. Metamorphosed volcanic and sedimentary rocks of the Kaminak Group are intruded to the west, north and southeast by large granitoid plutons and to the northwest by smaller granitoid bodies. The volcanic rocks are commonly pillowed and vary in composition from dacite to basalt with related gabbroic intrusions. Sedimentary rocks include quartzite and shale with numerous layers of magnetite iron-formation. There is extensive drift cover west and southwest of the properties.

CURRENT WORK AND RESULTS
Eighteen conductors detected during the 1973 and 1974 INPUT surveys were tested with vertical- and horizontal-loop EM and magnetometer surveys in 1975. Ground geophysical surveys were also done on nine conductors surveyed in 1974. Six drill targets were identified within Prospecting Permit 300, and five were later drilled. Two targets were outlined on Prospecting Permit 308 and 7 on the claims, one on each of the following groups: ACO 54-69, 70-85, 86-100, 141-158, HUB 25-28, WET 1-8 and WEX 1-7.

Fourteen holes, totalling 5,002 feet, probed thirteen conductors on Prospecting Permit 300 and one on claim HUB 3. The conductors are sulphide- and graphite-rich siliceous ash and argillite beds in volcanic rocks. Sphalerite and chalcopyrite were intersected in several holes but the best concentrations were only 0.25% Cu over three feet and 1.43% Zn over five feet.

KEEWATIN PROJECT

U.S. Steel Western Hemisphere Inc. 55 E,K,L; 65 H
now Essex Mineral Company,
1208, 7 King Street East,
Toronto, Ontario, M5C 1A2

REFERENCES
Bell (1971); Davidson (1970a, b); Heywood (1973); Laporte (1974a, b); Ridler and Shilts (1974); Wright (1967).

PROPERTY
The 1,085 claims staked at the beginning of this project and the 429 claims previously staked by Pennaroya Canada Ltee. (Laporte 1974a,b) are listed and located on Figure II-3.

[1]Keewatin Region District Geologist, DIAND

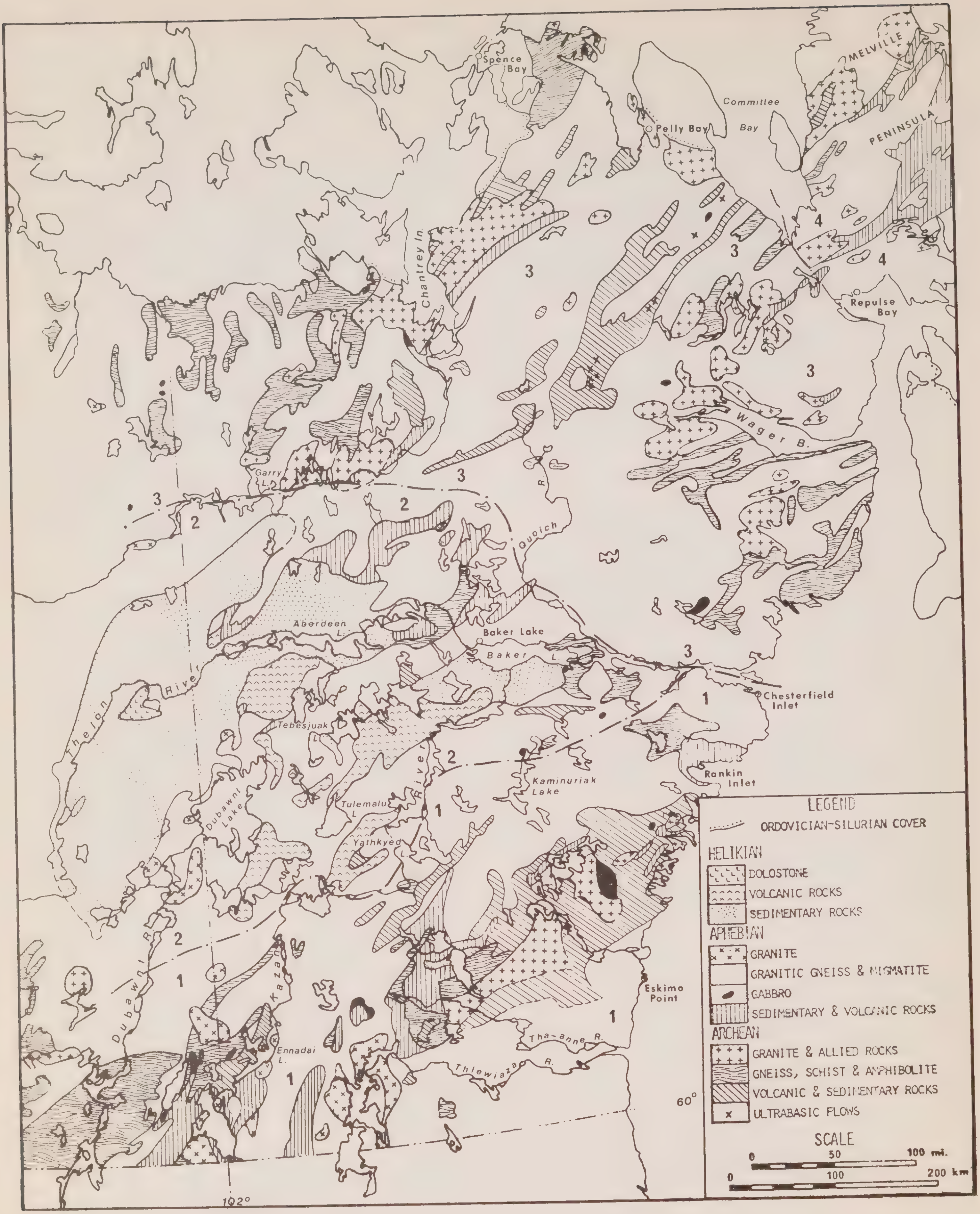


Figure II-1: Geology of the Keewatin Region showing subdivisions
1) Ennadai Lake - Rankin Inlet Area; 3) Chantrey Inlet - Wager Bay Area; and
2) Baker Lake - Thelon River Area; 4) Melville Peninsula

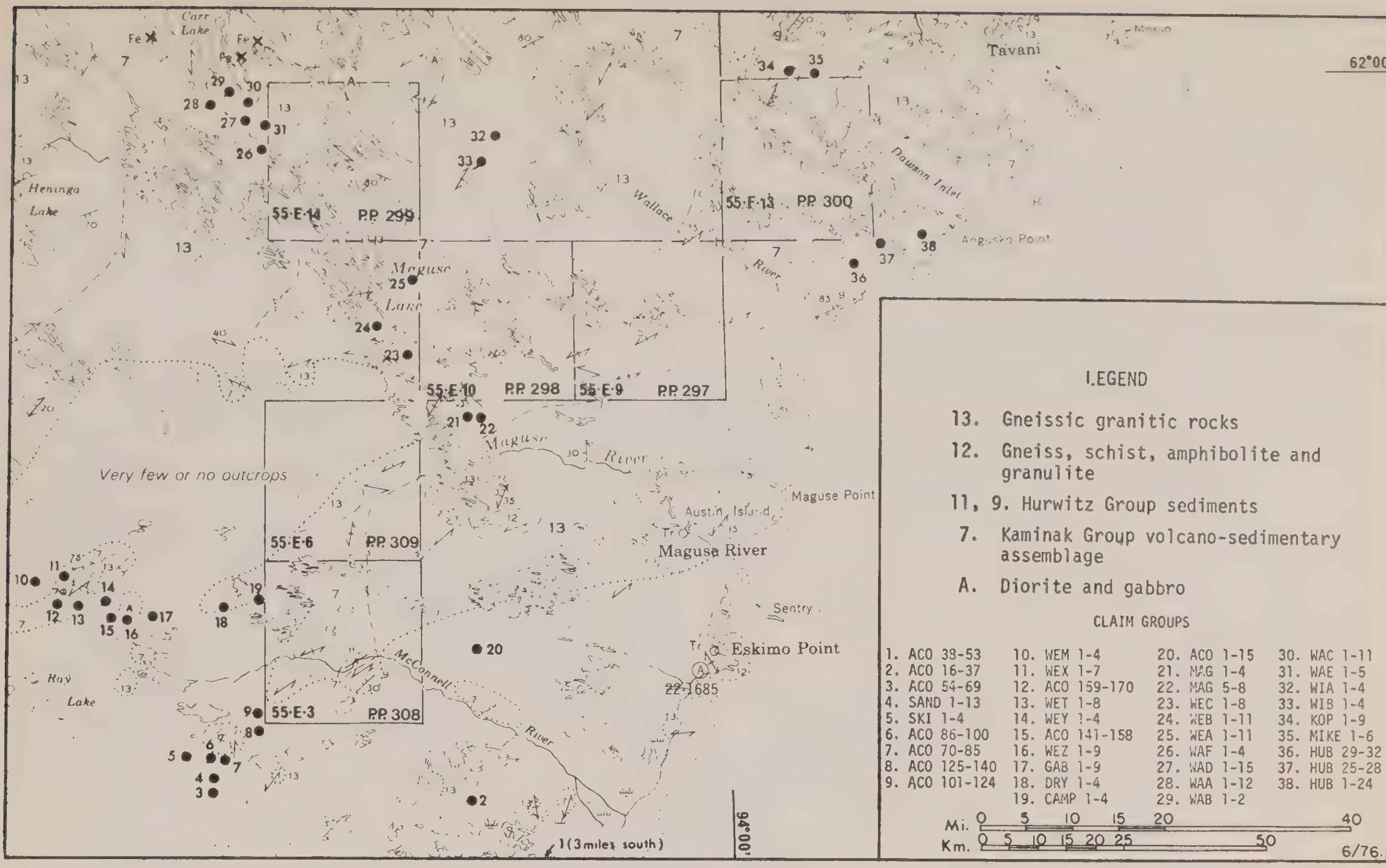


Figure II-2: Location of the Aquitaine Company of Canada Limited properties in the Maguse Lake - Wallace River Area. (Geology from Wright, 1967)

LOCATION
Four areas were studied: the Tavani area, west and northwest from Mistake Bay; the Kaminak area, southwest of Quartzite Lake; the West Kaminak area, west of the northwest arm of Kaminak Lake, and the Turquetil area, northwest and west of Turquetil Lake.

HISTORY
From 1969 to 1971, a joint venture of Pennaroya Canada Ltee. and three other companies explored four parts of the Rankin - Ennadai greenstone belt with geological mapping, airborne and ground EM and magnetometer surveys and diamond drilling (Mission Keewatin, Laporte, 1974a,b). In 1975, U.S. Steel Western Hemisphere Inc. undertook the exploration of anomalies not yet tested.

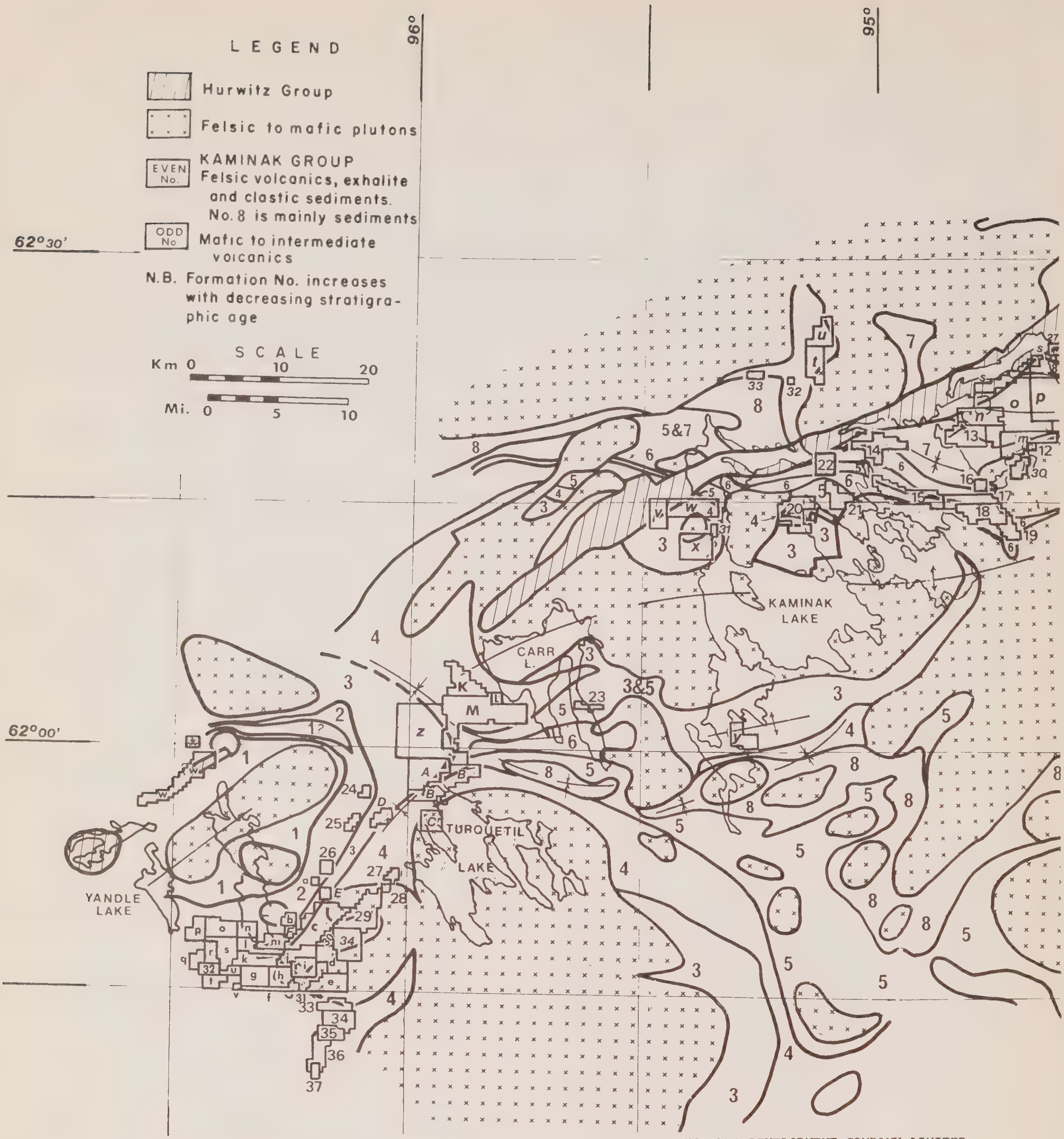
DESCRIPTION
The Tavani area is underlain by Archean mafic volcanics and minor felsic volcanics of the Kaminak Group. The volcanics are intruded to the south by a granodioritic pluton and overlain to the north by quartzite, slate, mudstone and sandstone of the Aphebian Hurwitz Group (Heywood, 1973).

The Kaminak area covers an Archean felsic volcanic centre composed of felsic tuff, agglomerate, flow breccia and associated quartz and quartz-feldspar porphyry intrusions intruded to the southeast by hornblende tonalite. Aphebian sediments and volcanics overlie the felsic volcanics to the northwest (Davidson 1970a).

Massive to pillowed mafic volcanics of the Archean Kaminak Group outcrop within the West Kaminak area. Hornblende tonalite intrudes the volcanics to the south and Aphebian sediments overlie them to the northwest (Davidson, 1970a).

The Turquetil area covers a north-east trending assemblage of mafic and felsic volcanics intruded to the southeast and northwest by hornblende tonalite (Bell, 1971).

CURRENT WORK AND RESULTS
The majority of the anomalous geophysical and geological environments have been covered by geological mapping, geochemical sampling and geophysical surveys during the 1975 season, and a number of targets have been outlined for diamond drill testing. A drill program to test these targets is planned for 1976.



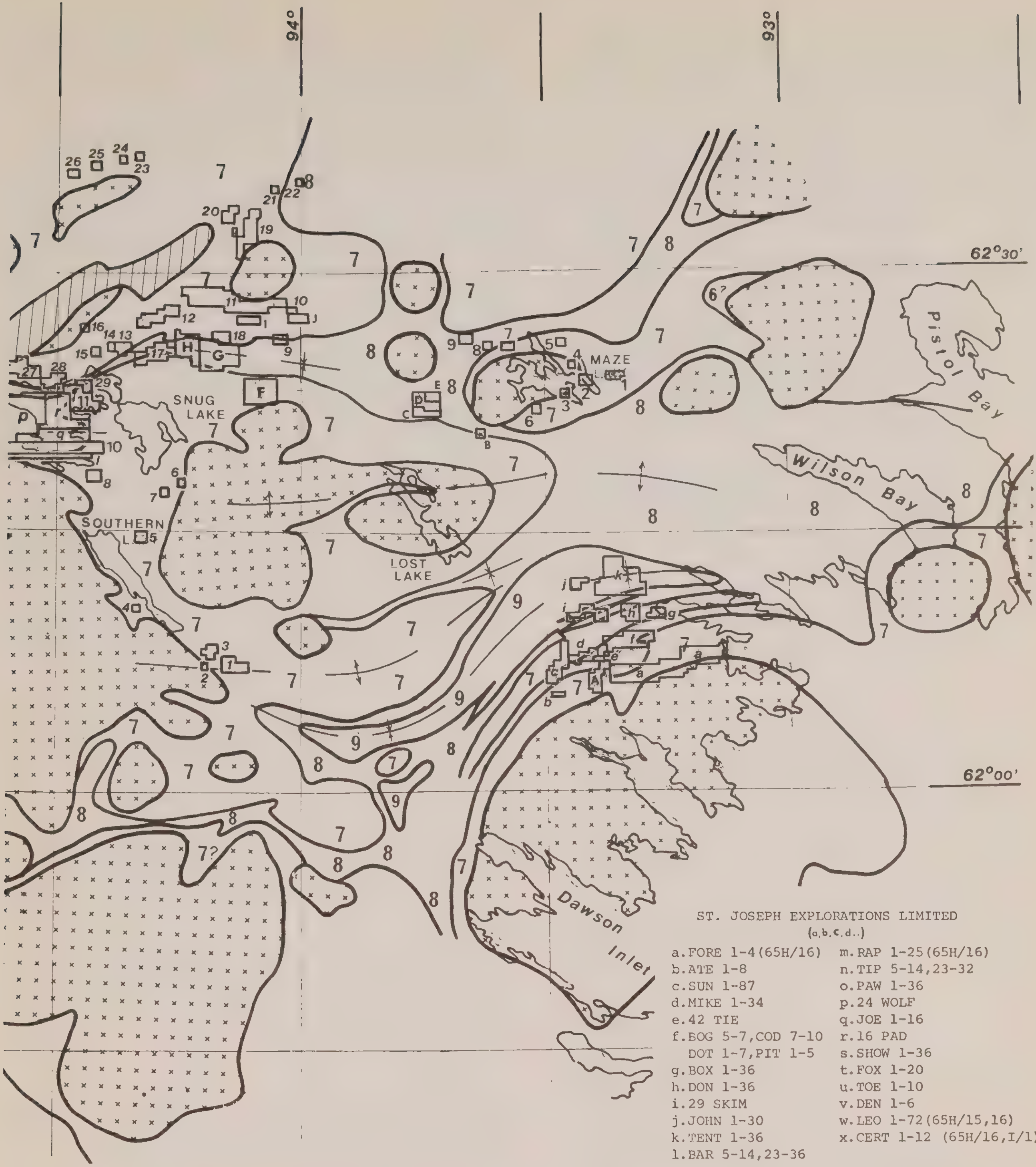
ESSEX MINERAL COMPANY
(*a..n..A*)

a.CRI 1-113(55K/3)
b.MU 1-3
c.LAMBDA 1-28
d.JZWL 1-12
e.ETA 1-3
f.POL 1-43
g.EPSILON 1-7
h.GAMMA 1-15
i.DELTA 1-21
j.THETA 1-8
k.BETA 1-67
l.PDQ 1-21(55L/7,8)
m.KOW 1-62
n.KL 1-5, 38 LAD
o.APE 1-139
p.KAT 1-148
q.PHAT 1-46
r.WATTA 1-52
s.DOG 1-44
t.DENT 1-43(55L/6)
u.TASS 1-35
v.GIN 1-28(55L/3)
w.RUM 1-52
x.RYE 1-63
y.JULIE 1-34
z.RAT 1-190(55E/13)
A.BEL 1-4, 9-69
B.TAN 1-74
C.SUE 1-25
D.20 BEL(65H/16)
E.IT 1-9
F.SH 1-8

HUDSON BAY EXPLORATION AND DEVELOPMENT COMPANY LIMITED
(*1..34*)

1.ESK 42-57(55L/1)
2.ESK 38-41
3.ESK 26-37
4.ESK 22-25
5.ESK 13-21
6.ESK 76-79(55L/8)
7.ESK 80-83
8.ESK 1-12
9.IMO 381-86
10.IMO 305-08
11.IMO 215-87
12.IMO 180-214(55L/8)
13.IMO 132-46
14.IMO 450-53
15.IMO 446-49
16.IMO 442-45
17.IMO 141-77
18.IMO 178-87
19.IMO 309-46(55L/9)
20.IMO 351-62
21.IMO 347-50
22.IMO 387-90
23.IMO 377-80
24.IMO 373-76(55L/9)
25.IMO 369-72
26.IMO 365-68
27.IMO 1-34(55L/7)
28.IMO 35-50
29.IMO 51-54
30.ESK 58-75
31.ESK 84-86(55L/3)
32.ESK 89-92(55L/6)
33.ESK 99-106
34.MAG 1-53(65H/16)

Figure II-3: Location of properties in the Kaminak Volcanic Belt. (Geology from Ridler and Shilts, 1974)



ST. JOSEPH EXPLORATIONS LIMITED
(a,b,c,d..)

a.FORE 1-4(65H/16)
b.ATE 1-8
c.SUN 1-87
d.MIKE 1-34
e.42 TIE
f.BOG 5-7,COD 7-10
DOT 1-7,PIT 1-5
g.BOX 1-36
h.DON 1-36
i.29 SKIM
j.JOHN 1-30
k.TENT 1-36
l.BAR 5-14,23-36
m.RAP 1-25(65H/16)
n.TIP 5-14,23-32
o.PAW 1-36
p.24 WOLF
q.JOE 1-16
r.16 PAD
s.SHOW 1-36
t.FOX 1-20
u.TOE 1-10
v.DEN 1-6
w.LEO 1-72(65H/15,16)
x.CERT 1-12 (65H/16,I/1)

NORANDA EXPLORATION COMPANY LIMITED
(1,2..31,32..)

1.BEE 1-8(55K/6)
2.BEAR 1-6
3.SIKSIK 1-4
4.RABBIT 1-4
5.WOLF 1-4
6.AARDVARK 1-4(55K/5)
7.SWAN 1-6
8.CRANE 1-4
9.DUCK 1-6
10.Q 1-69(55L/7)
11.IRMA 1-42
12.MIKE 1-6
13.NAK 1-47
14.NIK 1-51
15.TEA 1-62
16.KAY 1-9
17.JO 1-30
18.FOX 1-50(55L/2)
19.TOE 1-26
20.MULE 1-56(55L/6)
21.IN 1-28
22.OUT 1-25
23.10 ART(55L/4)
24.LOGAN 1-7(65H/16)
25.BOOT 1-10
26.GOOS 1-9(65H/16)
27.TIP 1-10
28.STURQ 1-4
29.AD 1-50,HUD 1-6,SON 1-4
30.KEV 14-16, 25-31
31.26 BAY
32.FRAN 1-15
33.HEN 1-22(65H/9)
34.MID 1-33
35.INK 1-22
36.LEG 1-30
37.SINK 1-8

OTHERS
(A,B..F..M)

A.18 TORIN (55K/3)	Giant Yellowknife Mines
B.A81583-86 (55K/5)	Selco Mining Corporation
C.A81573-82	Selco Mining Corporation
D.A43634-50	Selco Mining Corporation
E.A81565-72	Selco Mining Corporation
F.16 LAMOON, 19 TGOOD (55L/8)	M. Mulliette
G.A39901-14, 954-89	Selco Mining Corporation
H.33 HE	Selco Mining Corporation
I.A43622-33	Selco Mining Corporation
J.A81048-55	Selco Mining Corporation
K.44 DEE (55L/4)	Giant Yellowknife Mines
L.RUM 1-3,6-11	Dome Explorations Ltd.
M.128 SPI	Cominco Ltd.

YANDLE-KAMINAK PROJECT — Copper, Zinc
Noranda Exploration Company Limited — 55 K,L; 65 H
Box 1619,
Yellowknife, N.W.T.

REFERENCES
Bell (1971), Davidson (1970a), Gibbins *et al.* (1977), Heywood (1973), Laporte (1974a), Ridler and Shilts (1974).

PROPERTY
The numerous claim groups and Prospecting Permit 302 held by Noranda Exploration Company Limited are listed and shown on Figure II-3.

LOCATION
Prospecting Permit 302 extends west of Yandle Lake and the claim groups cover parts of the greenstone belt extending northeast from Heninga Lake to Kaminak Lake then east to the west shore of Hudson Bay.

HISTORY
Noranda Exploration Company Limited has been exploring the eastern part of the Rankin - Ennadai greenstone belt since it acquired Prospecting Permit 302 in April, 1973. All of the claims east of 95°W longitude, except the ART, FOX, TOE and MIKE, were staked in 1975. The MID 1-22, 28, 33 and LEG 11-23, 27-28 lapsed in early 1975 and the following claims lapsed in late 1975 and early 1976;
FOX 8, 14, 31-32, 39-40; TOE 1-3, 6-7, 12, 13, 22-23; JO 3, 18, 19; BAY, AD, BOOT, FRAN, GOOS, HUD, KEV, LOGAN, SON and TIP.

DESCRIPTION
The Rankin - Ennadai greenstone belt east of Yandle Lake is an Archean assemblage that has been divided into one incomplete and four complete mafic to felsic volcanic/sedimentary cycles (Ridler and Shilts, 1974). Most of the claim groups cover felsic volcanics. Prospecting Permit 302 is underlain by the western extension of the greenstone belt which consists of mafic and felsic volcanics and their metamorphosed equivalents. Hornblende diorite and biotite adamellite intrude the metavolcanics which, near Kinga Lake, are overlain by Aphebian sediments. Hurwitz Group sediments also outcrops along the north shore of Kaminak Lake.

CURRENT WORK AND RESULTS

MULE Claims
A 250-metre long series of narrow intersecting gossans discovered during a regional mapping program in 1974 were staked as the MULE claims. An INPUT survey flown by Questor Limited in May 1975 outlined a weak three-line conductor corresponding to the showing. Ground EM and magnetometer surveys of the area traced a discontinuous conductor and its associated magnetic anomaly over 800 metres. Geological mapping and one 84.43 metre long drill hole found sulphides, mainly pyrite, pyrrhotite and trace amounts of chalcopyrite and sphalerite, in the matrix of a felsic volcanic breccia interbedded with felsic agglomerate, tuffs and flows. The felsic sequence is in contact to the north and south with intermediate to mafic flows and is intruded to the west by tonalite. Two diabase dykes trend north-northeast across the east-trending volcanics. The drill core contained as much as 0.11% Cu over 1.26 metres and 0.13% Zn over 1.06 metres.

NIK Claims
The claims were staked to cover EM anomalies detected during a survey flown by Questor Limited in May 1975. An EM survey, using the horizontal shootback method, and a magnetometer survey on claims NIK 33 to 35 and 41 to 43 outlined a weakly conductive weakly magnetic anomaly. Similar claims on claim NIK 46 to 49 did not outline any anomalies

NAK Claims
The NAK claims cover ground held as the LAD claims by Penarroya Canada Ltee in the early 1970's (Laporte 1974a). An INPUT survey, flown by Questor Limited in May 1975, and ground EM and magnetometer surveys outlined a 500-metre long conductor. There is no magnetic expression associated with this conductor which trends north-northeast in the northwest part of the claim group. Geological mapping showed the claims are underlain by massive and pillowed mafic flows, a rhyolite flow and agglomerate and a thin band of black siltstone that may be graphitic. Semi-massive to massive pyrite with traces of chalcopyrite and locally sphalerite occur as small pods in the felsic volcanics south of the EM conductor.

HEN Claims (Gibbins et al., 1977)
Archean mafic and felsic metavolcanics intruded by quartz-feldspar porphyry and gabbro underlie the HEN claims. In 1975, the claims were surveyed with a gravimeter and one 99.67 metre-long hole was drilled to investigate pyrite-pyrrhotite concentrations in the gabbro. The core contained 0.15% Cu and 0.01% Zn over 13.71 metres.

PROSPECTING PERMITS 359, 360 AND CLAIMS
Hudson Bay Exploration and Development Company Limited — 55 L, 65 H
Flin Flon, Man.
R8A 1N9

REFERENCES
Bell (1971), Davidson (1970a), Ridler and Shilts (1974)

PROPERTY

ESK 84-88	55 L/3
ESK 89-92, 99-106	55 L/6
ESK 58-75; IMO 1-59	55 L/7
ESK 1-57, 76-83; IMO 442-453	55 L/8
IMO 131, 137-390	55 L/8,9
Prospecting Permit 359	65 H/9
Prospecting Permit 360	65 H/10

LOCATION
The 326 IMO and 100 ESK claims are north and northeast of Kaminak Lake (Fig. II-3) and the two prospecting permits extend east from Ameto Lake to 11 miles east of Ayotte Lake.

HISTORY
The prospecting permits were acquired and the claims staked in 1975. The claims lapsed in 1976.

DESCRIPTION
The properties cover outcrops of the Archean Kaminak Group volcanics. Archean sediments, mainly greywacke and slate, outcropping on Prospecting Permit 360 are overlain to the northwest by Aphebian sediments of the Hurwitz Group and intruded by granitic to gabbroic plutons.

CURRENT WORK AND RESULTS
EM surveys using both the helicopter-borne Barringer Research Dighem system and the HBED EM-30 system were flown over the prospecting permits and the Rankin - Ennadai greenstone belt in the Kaminak Lake area. Of the estimated 5,000 line-miles of EM surveys flown during the summer, 1,599.8 line-miles of EM-30 and 229.5 line-miles of Dighem surveys were on the prospecting permits. Some of the anomalies were prospected and surveyed with EM and magnetometers and two holes were drilled on anomalies north of Kaminak Lake.

RUM
Dome Explorations Ltd. under option to Cominco Ltd.
120 Adelaide Street West
Toronto, Ontario.
M5H 1T1

55 L/4
L62° 04'N, 95° 52'W

REFERENCE
Davidson (1970a), Padgham et al. (1976), Ridler and Shilts (1974)

PROPERTY
RUM 1-3, 6-11

LOCATION
The claims are on the northeast shore of the southeast arm of the Spi Lake (Fig. II-3).

HISTORY
The area was held and explored as the C claims by Canadian Superior Exploration Ltd. from 1970 to 1974 (Padgham et al., 1976). The claims were staked for Dome Explorations Ltd. in early 1974.

DESCRIPTION
Andesitic lapilli tuffs underlying the northern, western and southern part of the claim group enclose an arcuate band of rhyolite lapilli tuff in the east central part of the group. Gabbro dykes and bands of dolomitic alteration trend northeast in the volcanics.

CURRENT WORK AND RESULTS
Geological mapping at a scale of 1:3,000 did not outline sulphide concentrations or zones of economic interest.

SPI
Cominco Ltd.
120 Adelaide Street West
Toronto, Ontario.
M5H 1T1

55 L/4
62° 02'N, 95° 50'W

REFERENCE
Davidson (1970a), Laporte (1974a), Padgham et al. (1976), Ridler and Shilts (1974)

PROPERTY
SPI 1-123, 125-126, 128-130

LOCATION
The claims, covering the south half of Spi Lake, are one mile southwest of Carr Lake (Fig. II-3).

HISTORY
The SPI claims cover ground previously explored by Giant Yellowknife Mines Ltd. in 1961-62, Abidonne Oils Limited in 1969-70 (Laporte 1974a) and Canadian Superior Exploration Limited from 1970 to 1974 (Padgham et al., 1976). The north part of Spi Lake is held by Giant Yellowknife Mines Ltd. as the DEE claims on which 7,418 feet of drilling tested a massive sulphide showing in 1961. The SPI claims were staked in April, 1974 to cover geochemical anomalies outlined by a reconnaissance frost-boil survey (Ridler and Shilts, 1974).

DESCRIPTION
The claims are underlain by andesite lapilli tuff enclosing one dacite flow and, southeast of Spi Lake, a band of rhyolitic volcanic conglomerate. A thin band of iron formation outcrops at the base of the conglomerate in the eastern part of the claim group. The rocks trend east-northeast, face south and dip vertically.

CURRENT WORK AND RESULTS
Geological mapping of the claim group at 1:14,400 did not outline sulphide concentrations which could have caused the geochemical anomalies.

ROCHON LAKE PROJECT
Phelps Dodge Corporation of Canada Limited
1106, 55 Yonge Street,
Toronto, Ontario.

Zinc, Silver, Copper
65 C/13, D/16
60° 49'N, 101° 56'W

REFERENCES
Eade (1971), Gibbins *et al.* (1977), Taylor (1963)

PROPERTY
JIM 1-36, JOHN 1-36, MAC 1-18, ROY 1-16, UKE 1-23

LOCATION
The claims cover the central part of Rochon Lake.

HISTORY
The JIM and JOHN claims, staked in late 1973, were acquired by Phelps Dodge Corporation of Canada Limited in early 1974. The ROY and UKE claims were added to the property in 1974 and the MAC claims in 1975.

DESCRIPTION
A two- to four-mile wide belt of Archean intermediate to mafic metavolcanics trending east across the claims is intruded to the north, west and south by granodiorite and quartz monzonite.

CURRENT WORK AND RESULTS
Ground E.M. and magnetic surveys, totalling 3.4 and 5.3 line-miles, investigated islands on the MAC 6, 7, 12 and 13 claims and the JIM 22 and 23 claims. A single conductor was detected on the MAC claims. Two holes, totalling 963 feet, tested two conductors on JIM 4. The holes intersected metamorphosed intermediate to felsic volcanics and gneisses which in one of the holes, enclosed a 16.5 foot section of sulfides containing 0.11% Cu, 5.17% Zn and 0.21 oz./ton Ag.

B-ZONE GOLD DEPOSIT
O'Brien Gold Mines Ltd.
1916, 111 Richmond Street West,
Toronto, Ontario.

Gold
65 G/1,2,7,8
61°17'N, 98°31'W

REFERENCES
Eade (1974); Gibbins *et al.*, (1977)

PROPERTY

DON 1-9, PEN 3-31	65 G/1
DIT 1-36	65 G/1,2
TOM 1-24	65 G/7
AIR 1-12, DWE 1-17, GILT 1-15, 17-22, 25-29	65 G/7,8
IAN 1-20	65 G/8

LOCATION
The AIR, DWE, GILT and PEN claims extend across a widening of the Kognak River between Cullaton and Mountain Lake. The DON and DIT claims are five miles east-southeast and southeast of Mountain Lake. The TOM claims are eight miles north of Mountain Lake and the IAN claims are five miles north of Bernier Lake.

HISTORY
The B-Zone Gold Deposit was discovered and drilled by Selco Exploration Company Limited in 1962 and 1964 and restaked as the GILT claims in 1972. The PEN claims were added to the property in late 1973 and the AIR 1-12 and DWE 1-13 in 1974. The PEN 32-35 lapsed and DON, DIT, DWE 14-17, IAN and TOM were staked in early 1975. All of the claims staked in 1975, except the DWE, lapsed in 1976.

DESCRIPTION
The claims cover magnetite-siderite-chert iron-formation in greywackes and acid to intermediate pyroclastics. The B-Zone deposit occupies a 500-foot segment of a discontinuous iron-formation that has been traced for 5,000 feet. The iron-formation is deformed, broken and recemented by quartz, calcite and sulphides. Gold occurs in the sulphides but not all sulphides carry gold. Drilling in the 1960's and in 1973 (Padgham *et al.*, 1976) outlined 185,000 tons grading 0.97 oz./ton.

CURRENT WORK AND RESULTS
Eight Atco camp buildings and one steel building were airlifted to the property and erected near the adit portal 8,000 feet north of the Kognak River. A 400 kw generator and two 900 CFM compressors were set on concrete foundations in the service building. A 9- by 15-foot decline was driven on a grade of minus 18% for 348.5 feet.

MAG
Hudson Bay Exploration and Development Company Limited
Flin Flon, Man.
R8A 1N9

Au, Ag
65 H/16
61°48'N, 96°08'W

REFERENCE
Bell (1971), Padgham *et al.* (1976), Ridler and Shilts (1974)

PROPERTY
MAG 1-53

LOCATION
The claim group is centred four miles east of the southern part of Heninga Lake (Fig. II-3).

HISTORY
The claims were staked in 1973 and explored by a geochemical frost boil survey and a reconnaissance geophysical survey (Padgham *et al.*, 1976).

DESCRIPTION
The northern half of the claims is underlain mainly by mafic to felsic pillowed volcanics and agglomerate intruded to the south by massive grey hornblende tonalite. Two showings were discovered by prospecting between 1939 and 1948 and re-investigated in 1973. The southwestern showing, at the northeast corner of MAG 17, consists of galena, sphalerite, chalcopyrite and pyrite in a quartz vein trending 055° and dipping 45° southeast. This 8-inch wide and 230-foot long vein occurs in a quartz porphyry sill and one 0.7 foot long sample contained 2.92 oz./ton Ag and 162.40 oz./ton Au.

The northeastern showing, in the east-central portion of MAG 31 and the central portion of MAG 44, consists of disseminated pyrite, sphalerite and minor chalcopyrite in sheared rhyolite. The 24-foot wide by 60-foot long zone strikes 035° and dips 80°.

CURRENT WORK AND RESULTS
A Ronka EM-17 survey, totalling 44.68 line-miles, outlined numerous weak conductors. One, near the northeastern showing, coincides with a magnetic anomaly.

HENINGA LAKE PROJECT
Gemex Minerals Incorporated
under option to
St. Joseph Explorations Limited
90 Eglington Avenue West
Toronto, Ontario.
M4R 2E4

Zinc, Copper, Silver
65 H/16
61°47'N, 96°13'W

REFERENCES
Bell (1971), Gibbins *et al.* (1977), Ridler and Shilts (1974)

PROPERTY
The claims held by and staked for St. Joseph Explorations Limited are listed in Figure II-3.

LOCATION
Most of the claims are part of a four- to six-mile wide and ten-mile long group trending east across the south end of Heninga Lake (Fig. II-3). The LEO and CERT claims are centred five and eight miles northeast of Padlei.

HISTORY
The SKIM claims were staked in 1972 over ground previously held as the TOWER group and explored by Hudson Bay Mining and Smelting Company Limited from 1946 to 1958 (Gibbins *et al.*, 1977). The DON, MIKE and JOHN claims were staked in late 1974 and the other claims were added to the property in 1975.

DESCRIPTION
Both the northern and southern claim groups cover Archean Kaminak Group pillowed and massive mafic to intermediate flows interbedded with felsic pyroclastic rocks.

Detailed mapping in 1975 indicates that the DON, JOHN, MIKE and SKIM claims at the south end of Heninga

Lake are underlain by a northeast-trending sequence of felsic and intermediate volcanic rocks enclosing minor mafic volcanic flows and thin beds of greyish chert. A multi-phase intrusive complex ranging in composition from granite to gabbro outcrops in the southeastern corner of the claims. The felsic and intermediate rocks are mainly pyroclastic; dacitic lapilli tuff, the most common rock, generally consists of felsic clasts in a more mafic matrix. Copper-zinc-silver concentrations occur in a pyritic felsic pyroclastic zone extending 3,000 feet northeast from the centre of Heninga Lake.

CURRENT WORK AND RESULTS
In 1975, Questor Limited flew 990 line-miles of INPUT survey over an irregular area extending five to six miles east and west of the south half of Heninga Lake and a three- by ten-mile rectangular area extending northeast from Kinga Lake. A one line anomaly corresponding to the western extension of the main sulphide-rich zone was outlined on the DON, JOHN, MIKE and SKIM claims. The results of the INPUT survey on the other claims were not reported.

A 123 line-mile horizontal-loop EM survey on the DON, JOHN, MIKE and SKIM claims outlined seven in-phase and in-phase/out-of-phase anomalies and eleven out-of-phase anomalies. The best anomaly corresponds to a zone of massive pyrite, chalcopyrite and pyrrhotite and one of the out-of-phase anomalies corresponds to a zone of massive sphalerite with lesser amounts of pyrite and chalcopyrite.

Nine holes were drilled in 1975 to probe the eastern, western and down-dip extensions of the main sulphide-bearing felsic pyroclastic layer. Rhyolite and dacite lapilli tuff were the main rocks intersected. The clasts, one to two inches long, are generally stretched and enclosed in a fine grained sericitic or chloritic matrix. Andesite occurs within the pyroclastic sequence as minor flows or sills and dikes 10 to 100 feet thick. Four types of sulphide mineralisation have been intersected:
1) medium-grained, massive pyrite-chalcopyrite-sphalerite generally exhibiting large-scale layering and containing pyrrhotite and, locally, as much as three per cent magnetite
2) medium- to coarse-grained massive pyrite-sphalerite with well-developed layering
3) disseminated blebs and stringers of pyrite-chalcopyrite-sphalerite within the felsic pyroclastic rocks
4) discrete streaks and stringers of chalcopyrite-pyrite within pyroclastic rocks over core widths of up to 150 feet.

Three zones of massive sulphides have been outlined within the felsic pyroclastic unit:
1) the west copper-rich zone, under Heninga Lake, was intersected in three holes and appears to have a strike length of at least 600 feet;
2) the central copper-zinc-silver zone has been tested along a strike length of 300 feet by Gemex Minerals Incorporated (Gibbins *et al.*, 1977) but geophysical surveys indicate it may extend for 600 feet;
3) the east zinc-rich zone has been tested over a length of 600 feet and appears to be less than 400 feet long.

BAKER LAKE - THELON RIVER AREA

The Baker Lake - Thelon River area is underlain by a complex of gneisses and gneissic to massive granitic intrusions enclosing small remnant Archean volcanic belts to the south and three belts of Aphebian metasediments, with minor volcanic flows, to the northwest. Late Aphebian to early Helikian shallow-dipping conglomerates and arkosic sandstone and mudstone intruded by syenitic bodies and overlain by intermediate to felsic volcanic flows and pyroclastics cover the basement complex to the south and southwest of Baker Lake. Flat-lying quartzose conglomerates and sandstones of Paleohelikian age overlie the basement complex in the Thelon River area west of Baker Lake.

Uranium in the basement complex and late Aphebian to early Helikian sediments is the main target of exploration in the area. Two major developments in 1975 were the option of the Pan Ocean Oil Ltd. ground south of Baker Lake by Cominco Ltd. and the staking, in the fall, of parts of the Dubawnt Group rocks west of Yathkyed Lake by Noranda Exploration Company Limited, Pan Ocean Oil Ltd. and Urangesellschaft Canada Ltd.

BL AND TMT PROJECTS	Uranium
Pan Ocean Oil Ltd.	55 M, 56 D, 65 P
under option to	63°47'N, 95°45'W
Cominco Ltd.	
120 Adelaide Street West,	
Toronto, Ontario.	
M5H 1T1	

REFERENCES
Donaldson (1965); Gibbins *et al.* (1977); Le Cheminant *et al.* (1976, 1977); Wright (1976)

PROPERTY
The 11 prospecting permits and 895 claims of the BL and TMT Projects are listed in Figure II-4.

LOCATION
The prospecting permits and claim groups cover the east end of Baker Lake and extend west, south of Baker Lake, to southeast of Princess Mary Lake.

HISTORY
On January 15, 1975 Cominco Ltd. entered a joint venture as operator on 11 exploration permits and 895 claims in the Baker Lake area. Portions of this area had been explored by Pan Ocean Oil Ltd. during the preceding six years. Nine of the permits were acquired in 1974 and two, Prospecting Permits 347 and 348, in 1975. Most of the claims near Kazan Falls were staked in 1969, the BL claims were staked in 1971 and the K and TM claims in 1973. The TM 1-28 and K 363-394 claims lapsed in early 1976.

DESCRIPTION
The BL and TMT projects explored the east end and part of the southern section of a basin of Dubawnt Group sedimentary and volcanic rocks which overlie granitic gneiss and trend west-southwest from Baker Lake. The Kazan Falls and Christopher Island areas are underlain by conglomerate of the South Channel Formation and arkoses of the overlying Kazan Formation. The sediments are overlain to the west by intermediate to felsic flows and pyroclastics of the Christopher Island and Pitz Formation. Felsite

dykes, possibly feeders for the Christopher Island volcanics, and diabase dykes intrude the basement complex and the sediments.

Four types of uranium showings have been outlined in the area:
1) pitchblende-bearing fractures in basement gneiss;
2) mineralised brecciated cores of felsite dykes and brecciated gneiss cemented by lamprophyre;
3) pitchblende-bearing fractures in Christopher Island volcanics;
4) uranium disseminations in the Kazan Formation arkose at or near its contact with Christopher Island volcanics and feeder dykes, and diabase dykes.

A summary of the geology of the showings explored before 1975 is given in Table II-1.

CURRENT WORK AND RESULTS

Exploration in 1975 included:
- geological mapping at 1 inch to 0.25 mile of the 10 southern permits and part of the northern permit;
- geological mapping at 1 inch to 0.125 mile of a 16 square mile area centred on showings 74-1E and 74-1W;
- prospecting of the project area with scintillometers;
- geochemical survey over portions of Prospecting Permits 340 and 341 during which 423 water samples were taken at approximately one mile centres from lakes greater than 0.25 miles in diameter;
- geochemical survey over the drift-covered area between showings 74-1E and 74-1W during which 158 soil samples, collected on a 400 by 400 foot grid, were analysed for copper, silver and uranium;
- spectrometer surveys of 95, separate, 1200 by 1200 to 800 by 800 foot grids, covering 105 anomalies detected during the 1974 airborne survey;
- IP surveys of the 74-1E and 74-1W showings;
- magnetometer surveys of showings 74-1E, 74-1W, 75-1 and 75-2;
- VLF EM tilt angle and resistivity surveys of showings 68-4, 74-1E, 74-1W and 75-1;
- diamond drilling of nine holes totalling 2,364 feet on showing 74-1E, and 17 holes totalling 4,636 feet on showing 74-1W.

Regional geological mapping indicates that the basement rocks consist of acid and basic gneisses, granites and amphibolites with easterly-trending gneissosity. The South Channel Formation polymictic conglomerate, with clasts derived almost exclusively from basement rocks, unconformably overlies the basement complex and grades into the interbedded alluvial and aeolian arkosic sandstones and siltstones of the Kazan Formation. Large and medium scale cross-bedding characterise the arkoses which are thought to reach a maximum thickness of 900 feet. The end of Kazan Formation was marked by a period of north-south compression and erosion. Christopher Island Formation volcaniclastic sediments and porphyritic andesite to trachyte flows lie, with varying degrees of unconformity, upon the preceding formations. Martell syenite plugs outcropping in the eastern half of the project area are considered to be genetically related to the Christopher Island Formation volcanics. Overlying the Christopher Island Formation are the two porphyritic flows of the Pitz Formation. The Thelon Formation sandstone and conglomerate were deposited in fluvial valleys cut into the Pitz Formation. Northwest trending dykes of the Mackenzie Dyke Swarm cut all the rocks in the area.

Seven new uranium showings were found in 1975, three of which are of the 'sandstone' type and were studied in detail. The four other showings are:
75-1: a small fracture zone in an outlier of Christopher Island volcanics probably resting on Archean basement and intruded by a diabase dyke. An area 15 feet square contains chalcocite, chalcopyrite, pyrite, malachite and probably pitchblende. A grab sample of this mineralization contained 0.045% U_3O_8 and 0.42% Cu. Two similar showings were found, to the northeast, by Geological Survey of Canada crews (Le Cheminant *et al.* 1976).
75-2: an area of Christopher Island Formation pyroxene-biotite porphyry with patches of green-brown unoxidized ground-mass which registers up to 22,000 c.p.m. on the total count channel of a McPhar TV-1 scintillometer. No uranium minerals were observed and no assays are reported.
75-4: smears of hematite and pitchblende along fractures and small shears in a Martell Syenite plug.
75-7: a 25- by 50-foot fractured area in volcaniclastic conglomerates of the Christopher Island Formation contains up to 500 ppm U_3O_8. High scintillometer readings were obtained along east-trending fracture zones as far as 90 feet from the central zone.

The detailed study of five of the sandstone-type showings, 74-1E, 74-1W, 75-3, 75-5 and 75-6, indicate that the occurrences probably formed through the precipitation of uranium and varying amounts of copper, silver, molybdenum and lead in physico-chemical traps resulting from alteration of the sandstones in the vicinity of igneous intrusives. Alteration consists of a series of colour changes and albitization. The colour changes reflect the following textural and mineralogical adjustments:
a) removal or conversion, to chlorite or 'glassy' hematite, of much or all of the dusty hematite coating the sand grains;
b) development of pale yellow to green chlorite in the interstices between grains especially in the formerly hematite-rich silt laminae;
c) transformation of detrital magnetite grains to aggregates of orange-red, acicular, translucent 'glassy' hematite.

Three color phases, defined in the field, reflect variations in the degree of development of these features and are crudely and concentrically zoned away from the dyke rocks. Bleached rocks, closest to the dyke, are white to grey on fresh surface, essentially barren and show extreme removal of the hematite and crystallization of chlorite. Variably colored rocks comprise the bulk of the mineralised rocks, present varied and diffuse color patterns with patches of grey to white and cherry red blending into light orange to grey, and were produced through the development of chlorite and the transformation of the magnetite to 'glassy' hematite. A cherry red alteration, in irregular zones at the periphery of the color alteration, is associated with the highest uranium and native copper content and results mainly from extensive development of the 'glassy' hematite derived from detrital magnetite. Albitization, evident within all of the color altered rocks, extends from 15 to 200 feet beyond the limits of color alteration and consists of the replacement of the original calcite cement by albite, minor quartz and potassium feldspar overgrowths. The distribution of the igneous bodies and intersecting fracture zones and the transmissivity, heterogeneity and sedimentary structures of the

PROTEROZOIC

Gabbroic diabase dyke

Paleohelikian

12. Granite

Dubawnt Group

11. Thelon Formation: sandstone, conglomerate
10. Pitz Formation: quartz-feldspar porphyry
9. Alkalic igneous rocks; includes Martell Syenite
8. Christopher Island Formation: volcanics and volcaniclastic sediments
7. Kazan Formation: arkose
6. South Channel Formation: conglomerate

Aphebian or Archean

5. Orthoquartzite, minor slate, argillite, conglomerate and impure quartzite
4. Volcanics; in part interlayered with 3 and 5
3. Schist, phyllite, greywacke, argillite
2. Gneissic quartz monzonite and granodiorite, augen gneiss, migmatitic gneisses and granulite
1. Layered granodiorite gneiss, migmatite and, east of diabase dyke, amphibolite, quartzo-feldspathic paragneiss, garnet-biotite schist and oxide iron-formation

A. Anorthosite
B. Gabbro, metagabbro

CLAIMS GROUPS

a: 223 BL (200-450)
b: 193 BL (1-200)
c: TM 261-69, 71-73
d: 10 TM (233-255)
e: BIS 2-20
f: 62 TM (138-225)
g: K 355-59
h: 6 AXE, 1 CAN, 5 FIRE, 21 JET, 20 KEN, 21 LAURINE, 3 LIZ, 5 MAC, 7 PEG, 15 PIC, 15 RAT, 2 SOB, 9 ZAP
i: TM 31-98
j: TM 1-28
k: K 363-94
l: K 265-91, 294-309
m: K 311-12, 314-35, 337-48
n: K 231-64

Figure II-4: Location of Pan Ocean Oil Ltd. properties and uranium showings in the Baker Lake area. (Geology from Donaldson 1965, 1966 and Le Cheminant 1976, 1977)

TABLE II-I

GEOLOGY OF THE BAKER LAKE AREA URANIUM SHOWINGS

SHOWING	LOCATION	ORE CONTROLS AND GENERAL GEOLOGY	RESULTS OF EXPLORATION
68-4 (69-4)	63°41'25"N 95°46'21"W	Open fractures in basement gneiss filled with massive botryoidal pitchblende and calcite. Later chalcopyrite and bornite impregnate wall rock and fracture fillings. Wall rock alteration is predominantly feldspathic with local hematization and minor chloritic alteration.	Six holes (2274') outlined three north-trending fracture systems. The easterly zone, explored over 1000' and to a depth of 300', averages 0.46% U_3O_8 over 6.1'.
68-4A (69-4A)	63°40'57"N 95°44'02"W	Narrow radioactive veins, with mineralogy similar to above, in slaty schist and interbanded felsic gneiss.	Radiometrics indicate grades compatible with 68-4 material.
68-2	64°10'11"N 94°33'25"W	30-foot wide and 690-foot long internally zoned, autobrecciated and brecciated felsite dyke enclosing basement xenoliths. Contains disseminated pitchblende with minor botryoidal concentrations and appreciable molybdenum.	10 drill holes (2311') outlined a north-plunging mineralized zone 30' wide and up to 110' deep extending 600' along plunge.
68-1	64°04'35"N 94°32'53"W	Fracture fillings and impregnations in Kazan Formation sandstones near a large diabase dyke. Disseminated pitchblende, uraninite and ubiquitous but minor molybdenum, chalcopyrite and pyrite are present.	19 holes (3259') outlined two zones 200' by 150' by 150' of approximately 0.04% U_3O_8.
69-9A	64°06'42"N 94°37'12"W	Erratic fractures and small brecciated zones in east-trending dyke-sill complex of Christopher Island Formation. Massive botryoidal pitchblende, minor chalcocite, bornite and molybdenum present.	Average of 0.2% U_3O_8 over 8' along 50' strike length.
69-9	64°06'21"N 94°36'57"W	Contact zone between Kazan Formation and Christopher Island Formation with uraninite, pyrite, chalcopyrite and bornite intermittently disseminated along a 1500-foot length of contact. Calcite and quartz veins parallel contact and a diabase dyke was encountered in drilling.	Up to 0.04% U_3O_8 over 8' in trench. Trace values in drill holes.
71-2	64°09'N 94°33'W	Large explosion breccia of basement fragments cemented by lamprophyre dykes. Botryoidal pitchblende in crevices with minor pyrite, chalcopyrite and sphalerite.	Grab sample assayed 0.153% U_3O_8.
71-4	64°04'30"N 94°31'W	Pitchblende or uraninite and chalcocite impregnations in coarse pebbly horizons of Kazan Formation adjacent to a diabase dyke.	Grab sample contained 1.16% U_3O_8 and 2.29% Cu.
71-5	63°42'50"N 95°40'18"W	Smudgy pitchblende and yellow oxide smears along fractures in biotite trachyte dyke and in tuffaceous sandstone of Christopher Island Formation.	One grab sample assayed 0.52% U_3O_8.

sandstones have controlled the extent of alteration and mineralization.

Showing 74-1E (63°48'22"N, 95°33'18"W) is in an aeolian sequence of the Kazan Formation which displays giant cross-beds and overlies a sequence of alluvial rocks including wavy lamellar and cross-bedded arkoses and minor shales and siltstones. A five-foot wide lamprophyre dyke enclosing large boulders and smaller xenoliths of granitic basement gneiss intrudes the arkoses. Uranium occurs in variably altered and cherry red altered giant cross-bedded arkoses in an arcuate zone. Three of the nine holes drilled intersected the main uranium-rich zone which outcrops irregularly over a 600- by 200-foot area and three other holes intersected thin copper-rich zones which apparently occur on the outer edge of the colour alteration zones.

Showing 74-1W (63°48'59"N, 95°35'09"W) is in alluvial facies Kazan Formation sandstones similar to the barren rocks underlying the uranium-bearing aeolian rocks of showing 74-1E, but with less wavy lamellar and more cross-bedded arkoses. Uranium, copper, lead, molybdenum and silver occur in numerous lenses within a 120-foot wide irregular zone of variable and cherry red colored rocks which trends north parallel to a major fracture and/or dyke system. Six of the 17 holes drilled intersected short intervals of uranium-rich rocks separated by longer intervals of barren rock. In one hole, mineralized rock was intersected to a depth of 480 feet but in the other holes, mineralization terminates at shallow depth. In the deeper hole, the core from 55 feet (18.3 m.) to 415 feet (137.9 m.) contained 0.114% U_3O_8.

Uranium at showing 75-3 (63°47'51"N, 95°07'44"W) occurs over a wide area of giant cross-bedded aeolian arkoses intruded by one 30-foot wide and numerous thinner dykes of lamprophyre. Bleached and variable color altered rocks are present; the latter hosts the uranium. Two grab samples from the area assayed 0.075% U_3O_8 and 0.04% Cu, and 0.025% U_3O_8 with no copper.

Showing 75-5 (63°45'N, 95°14'25"W) consists of an unidentified uranium mineral, chalcocite and malachite along fractures and disseminated in the siltstone matrix of South Channel Formation conglomerate which is intruded by fine-grained biotite porphyry. A grab sample contained 0.17% U_3O_8.

Showing 75-6 (63°50'05"N, 95°35'09"W) lies in channel facies, Kazan Formation, medium cross-bedded to massive, fine- to coarse-grained sandstones interbedded with thin-bedded sandstones. It is 4,000 feet north and almost exactly on the extension of the linear trend at showing 74-1W. The showing is defined by three small outcrops and numerous subcropping boulders in a north-trending zone 450 feet long and up to 120 feet wide. Uranium and copper occur in cherry red and variable color altered rocks, grab samples of which assayed 0.10% U_3O_8, 0.96% Cu, and 0.61% U_3O_8, trace Cu.

THELON PROJECT
Shell Canada Limited 65 O
1027 - 8 Avenue Southwest,
Calgary, Alberta.

REFERENCES
Gibbins *et al.* (1977); Wright (1976)

PROPERTY

Prospecting Permit 330	65 O/5
Prospecting Permit 331	65 O/6
Prospecting Permit 332	65 O/11
Prospecting Permit 333	65 O/12
Prospecting Permit 334	65 O/13
Prospecting Permit 335	65 O/14

LOCATION
The 32-mile wide by 52-mile long project area, centred 80 miles southwest of Baker Lake, extends south from Wharton and Marjorie Lakes to within 12 miles of Tulemalu Lake.

HISTORY
Prospecting Permits 330 to 335 were acquired by Shell Canada Limited in 1974.

DESCRIPTION
The project area is underlain mainly by Archean and/or Aphebian gneissic granite and granodiorite. Northwest-trending conglomerate and pebble sandstone of the Thelon Formation underlie a 32-mile long and 2- to 8-mile wide zone in the centre of the project area. Pitz Formation prophyritic volcanics outcrop in a two-mile wide and eight-mile long belt west of the sediments and underlie most of the southern half of Prospecting Permits 330 and 331.

CURRENT WORK AND RESULTS
Geological mapping of the permit areas and scintillometer and spectrometer surveys over 14 grids covering anomalies detected during the 1974 airborne survey failed to outline concentrations of uranium. The anomalies investigated in the northeast and southeast parts of the project area are caused by slightly radioactive granites and pegmatite bodies.

Reconnaissance airborne geophysical surveys and geochemical surveys explored the area northwest of Yathkyed Lake and east of the Thelon Game Sanctuary.

BAK CLAIMS — Uranium
Shell Canada Limited — 65 O/8
1027 - 8 Avenue Southwest, — 63°12'N, 98°25'30"W
Calgary, Alberta.

REFERENCES
Wright (1967)

PROPERTY
BAK 1-12

LOCATION
The BAK claims are 25 miles southeast of Tebesjuak Lake.

HISTORY
The claims were staked in 1975.

DESCRIPTION
Intermediate volcanic, possibly Christopher Island Formation, are intruded by feldspar porphyry dykes on

the claims.

CURRENT WORK AND RESULTS
In 1975, some of the claims were mapped at 1 inch to 200 feet; frost boils were sampled and scintillometer surveys were performed over five line-miles of grid. Small uranium and thorium concentrations in two locations along joints and fractures in massive quartz latite flows were trenched and sampled. The best sample contained 360 ppm U_3O_8. Pitchblende was also found in float southwest of the trenched showings.

PROSPECTING PERMIT 362
Rio Alto Exploration Ltd. — 65 P/14
205, 736 Eighth Avenue, S.W. — 63°52'N, 97°15'W
Calgary, Alberta.
T2P 1H4

REFERENCES
Donaldson (1965); Laporte (1974a); Le Cheminant (1977); Wright (1967)

PROPERTY
Prospecting Permit 362

LOCATION
The permit covers the area east of Pitz Lake, southwest of Baker Lake.

HISTORY
Aquitaine Company of Canada Ltd., who held the area as Prospecting Permit 160 from 1969 to 1971, performed photo-geological studies and airborne magnetic and radiometric surveys and examined anomalies with scintillometer surveys, prospecting and rock and soil sampling. EM and magnetometer surveys flown in 1970 over an area of anomalous copper concentrations in the soil found no conductors.

Prospecting Permit 362 was acquired by Rio Alto Explorations Ltd. in 1975.

DESCRIPTION
The permit area is underlain by volcanics of the Pitz Formation and sandstones of the Thelon Formation.

CURRENT WORK AND RESULTS
In 1975, Taiga Consultants Ltd. prepared a photogeological interpretation of the permit area.

PROJECT K-1, BAKER LAKE
Urangesellschaft Canada Ltd. — 66 A, B, G
Box 56, Toronto-Dominion Centre, — 64°45'N, 97°30'W
Toronto, Ontario.
M5K 1E7

REFERENCES
Donaldson (1966, 1969); Gibbins *et al.* (1977); Wright (1967)

PROPERTY
The 10 prospecting permits explored as part of Project K-1 are outlined in Figure II-5.

LOCATION
The project area extends from the Thelon River, northwest of Baker Lake, west to south of Aberdeen Lake and northwest to south of Deep Rose Lake.

HISTORY
Prospecting Permits 318 to 327 were acquired by Metallgesellschaft Canada Ltd. in 1974 (Gibbins *et al.* 1977). Prospecting Permits 352 to 357 were acquired by Urangesellschaft Canada Ltd. in 1975 and were explored in conjunction with the remnants of Prospecting Permits 318 to 320 and 327.

DESCRIPTION
The project studies covered parts of two northeast-trending belts of Aphebian metasediments and minor volcanics enclosed within gneissic granite, as well as parts of a triangular area of Dubawnt Group sediments which unconformably overlie the Aphebian and Archean rocks west of Schultz Lake.

CURRENT WORK AND RESULTS
Exploration in 1975 involved: reconnaissance geological mapping of the newly acquired permit areas; airborne radiometric surveys along various lines during geochemical sampling and transfer flights from the Sissons Lake base camp; detailed airborne surveys on lines 0.25 mile apart over seven areas; reconnaissance lake-water and lake-sediment geochemical surveys of the new permits with analyses of the water samples for radon in the field and uranium at a commercial laboratory, and analysis of the sediments for uranium, copper, lead and zinc at a commercial laboratory; and detailed prospecting and scintillometer surveys of the permit areas in the vicinity of geochemical and radiometric anomalies.

The Sissons Lake showing, five miles north of Sissons Lake, was mapped at 1:2400 and the adjacent area at 1:10,680. Soil samples were collected at 50-foot intervals along lines 100 or 200 feet apart from holes six to eight inches deep and analysed for radon content. A radon water survey covered a 600- by 3500-foot area. EM-16 profiles were run across the apparent strike of the main showing. The radon surveys did not detect any new anomalies.

A scintillometer survey at 100-foot spacing along a 5600-foot length of the sub-Thelon Formation unconformity outlined small areas of high radioactivity in structures which may be ancient river channels.

CHANTREY INLET-WAGER BAY AREA

A discontinuous belt of Archean volcanic and sedimentary rocks enclosing ultramafic flows and sills trends northeast across the central part of the Chantrey Inlet-Wager Bay Area. The belt lies in a granitic basement complex consisting of north- to east-trending belts of felsic to mafic gneisses within gneissic to massive granitic intrusions of Archean and Aphebian age. In 1974 the nickel-copper potential of the Archean sedimentary and volcanic rocks in the vicinity of the ultramafic bodies was studied.

HAYES RIVER PROJECT
Cominco Ltd. — 56 J/13
1700-120 Adelaide Street West. — 66°52'N, 91°45'W
Toronto, Ontario.

REFERENCES
Heywood (1961), Gibbins *et al.* (1977)

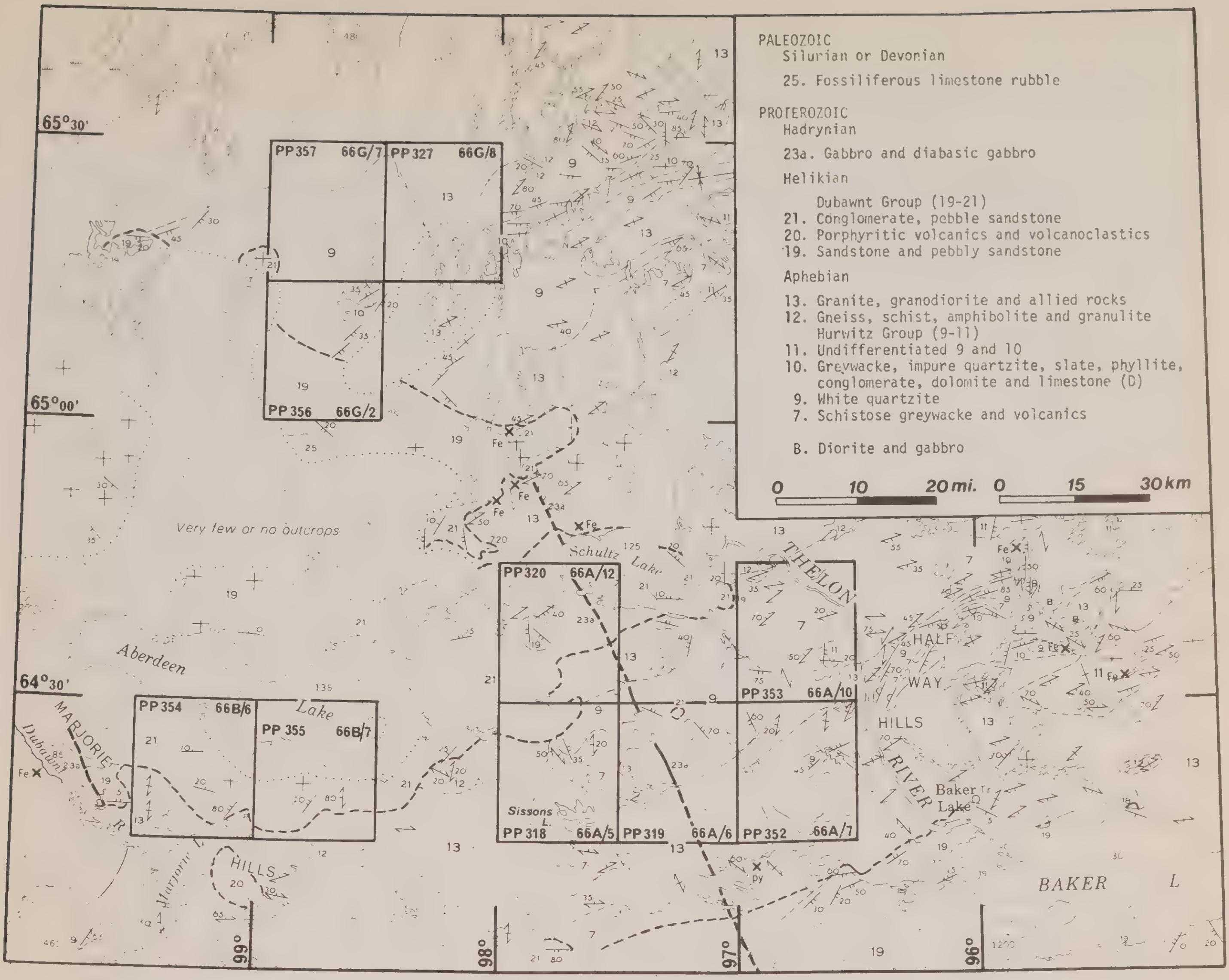


Figure II-5: Location of the prospecting permits held by Urangellschaft Canada Ltd. west of Baker Lake (Geology from Wright, 1967)

PROPERTY
Prospecting Permit 349

LOCATION
The permit area extends northeast from the north end of a major south-trending widening of the Hayes River.

HISTORY
The Hayes River area was explored by King Resources Company and Aquitaine Company of Canada Limited in the early 1970's. Cominco Ltd. had small crews doing reconnaissance studies in the area in 1970 and 1974 (Gibbins *et al.*, 1977) and acquired Prospecting Permit 349 in 1975.

DESCRIPTION
The area is underlain by Archean granitic gneisses enclosing a northeast-trending belt of metasediments, metavolcanics and minor ultramafic flows with well-developed spinifex textures.

CURRENT WORK AND RESULTS
Reconnaissance and detailed geological mapping, prospecting and EM and magnetometer surveying of 800 acres failed to outline economic concentrations of sulphides although disseminated pyrite, pyrrhotite and minor chalcopyrite are common in the ultramafic flows and the metasediments.

MELVILLE PENINSULA

Precambrian rocks of Archean or Aphebian age outcropping in two major east-northeast trending belts have been moderately to intensely folded, metamorphosed, granitized and intruded by granitic and pegmatitic rocks. Two groups of supracrustals have been defined: the Prince Albert Group, forming the

northern belt, comprises greenstone, quartzitic and micaceous schists, quartzite and iron-formation and the Pernhyn Group, an assemblage of crystalline limestone, quartzite, paragneiss and schist which forms the southern belt.

MELVILLE PENINSULA IRON DEPOSITS — Iron
Borealis Exploration Limited — 47 A,B
940 8th Avenue S.W.
Calgary, Alberta

REFERENCES
Heywood (1967); Laporte (1974a).

PROPERTY

IAN 1-6	47 A/4
DON 1-24	47 A/5, 6
JEF 1-46, LIZ 1-55	47 A/6
AL 1-29, JAC 1-14, JAY 4-13	47 B/2
ALE 4-14, 18, DUG 1-11, LIN 1-20	
RIK 2-7, 9-11, 13-15	47 B/7

LOCATION
The IAN, DON, JEF and LIZ claims, near the east coast of Melville Peninsula, are 28 miles southwest, 11 miles west-southwest, 7 miles west and 7 miles northwest of the mouth of the Ayergotadlik River. Claim groups on the western coast include: the AL, JAC and JAY, 9 miles east of Cape Finlayson; the DUG and RIK, 14 miles east of Cape Sibbald, and the ALE and LIN, 13 miles east of the south end of Glen Island.

HISTORY
The claims were staked between 1968 and 1970 during reconnaissance airborne and ground magnetometer surveys, reconnaissance and detailed geological mapping and channel and bulk sampling of iron-formation.

Nine iron deposits were outlined in the western part of Melville Peninsula and five in the eastern part (Laporte, 1974a). Metallurgical tests indicate that a magnetite concentrate of 68 to 70 percent soluble iron can be produced without the use of flotation cells and that the ore contains no impurities.

DESCRIPTION
The eastern claims cover parts of a 4- to 8-mile wide, 50-mile long north-northeast trending belt of Prince Albert Group quartzite metasediments and metavolcanics which include several steeply-dipping iron-formations outcropping in a folded zone 4 miles wide and 30 miles long. Five deposits, each at least 400 feet wide and over 4,000 feet long, were outlined in the main belt and a smaller belt four miles to the southeast. The thinly laminated to massive iron-formation consists of alternating laminae of magnetite or quartz-magnetite and quartzite.

To the west, magnetite-quartz iron-formation with minor specularite is associated with metamorphosed mafic volcanics, quartzite and micaceous garnetiferous paragneiss. Nine separate iron deposits similar in composition to the eastern deposits but structurally more complex, have been outlined.

CURRENT WORK AND RESULTS
Three sections were channel-sampled in 1975: one 560-foot long section on the IAN claims, one 700-foot section on the LIN claims and one 1,415-foot section on the DUG claims. Analysis of the samples gave results similar to that of the 1969-70 work (Laporte 1974a).

ARCTIC ISLANDS REGION

W.A. Gibbins[1]

D.I.A.N.D., Geology Office, Yellowknife

There was less exploration in the Arctic in 1975 than in the previous years mainly because of a decline in activity in the Cornwallis and Strathcona Sound lead-zinc districts. However, there was new exploration for uranium on Baffin Island.

The Arctic Archipelago covers parts of several major geological provinces. Precambrian rocks of the Churchill Province are exposed in the Minto Arch, Boothia Uplift, and on Baffin Island and form a crystalline basement under much of the younger sedimentary cover. The north trending Cornwallis Fold Belt, which divides the Arctic Platform and Franklin Geosyncline into eastern and western parts, developed mainly in Silurian and Devonian time in response to periodic faulting caused by movements of the Boothia Uplift. The Sverdrup Basin, which in late Paleozoic and Mesozoic time was superimposed on the folded Franklin Geosyncline, was itself folded in the Cenozoic.

In addition to oil and gas, and lead-zinc, uranium and diamond prospects, iron, gypsum and coal have been reported at several localities.

Access to the Arctic Islands is by regular jet service from the south to Resolute Bay, Frobisher Bay, Cambridge Bay or Inuvik. Most Arctic settlements have scheduled Twin Otter flights at least once a week. Camp moves and re-supply flights for exploration crews are usually done by chartered Twin Otters equipped with oversize tires for landing on the Arctic tundra. These aircraft are available in Resolute Bay and Frobisher Bay.

BAFFIN ISLAND

In 1975, Cominco Ltd., collected stream sediment samples for heavy mineral analysis during a reconnaissance of the Brodeur Peninsula for kimberlite intrusions. Trigg Woollett and Associates Ltd. surveyed lake sediments for Noranda Exploration Ltd. on those parts of Northern Baffin Island and northern Melville Peninsula that are underlain by Proterozoic sediments. Nanisivik Mines Ltd. worked claims adjacent to the lead-zinc deposit they are bringing into production and reconnoitered Northern Baffin Island. The Frobisher Bay-Cape Dorset areas on southern Baffin Island, were explored for uranium by Imperial Oil Ltd.

Baffin Island is underlain by an Archean basement complex of heterogeneous, complexly folded granitic gneisses. In several areas, particularly on southern Baffin Island, this complex includes belts of Aphebian metasediments and metavolcanics including limestone, quartzites and schists. A thick sequence (12,000+ feet) of Helikian rocks on Northern and north-western Baffin Island can be divided into a lower sandstone-volcanic assemblage - the Eqalulik group - and an upper succession of shale, dolomite, dolomitic siltstone, siltstone and sandstone - the Uluksan group. Flat lying cratonic sequences of lower Paleozoic sediments cover parts of Baffin Island. The two largest areas are the Brodeur Homocline of the Arctic Platform and the Great Plains of the Koukdjuak at the southeast end of the Foxe Basin.

FROBISHER BAY PROJECT

Imperial Oil Ltd.,	Uranium
111 St. Clair Avenue West,	25 N/9,10,15,16
Toronto, Ont.	63°45'N, 68°28'W

REFERENCES
Blackadar (1967a), Laporte (1974a)

PROPERTY

ALE 1-36, DAN 1-36, HOW 1-36	25 N/9
AJM 2-4, 7-11, 16-20, 24, 28-30	25 N/10
TREV 6, 9, 12, 16, 17, 20, 21, 24, 25, 27-35, ELF 1-36, KES 1-21, 23-34	25 N/15
DBL 1-36, DUN 1-36, FIR 1-36, MAC 1-36, SHU 1-36	25 N/16

LOCATION
The claims are immediately east, north and south of the village of Frobisher Bay, southern Baffin Island can be reached by road or boat.

HISTORY
The area was prospected by Jack Cunningham and Ross Toms in the 1950's.

In April and May of 1967, 1,075 ROSS claims were staked for Snowdrake Ltd. This company undertook airborne and ground scintillometer surveys and located and examined several radioactive zones in granite and granite gneiss. The Apex Hill locality, included in the present claim group, was the most radioactive and was trenched and sampled. Results were disappointing as only a few selected grab samples showed more than a trace of U_3O_8 and the claims were allowed to lapse. Surface leaching of uranium is not important as shown by two instances where radioactivity on the surface of the outcrop was considerably greater prior to blasting than in the freshly excavated trench after the blast.

In 1969, 216 FOX and 108 MIKE claims were staked and the area was re-examined for the Kabluna Syndicate, by Norman H. Ursel Associates Ltd. (Laporte, 1974a). An airborne survey of the claims made with a Scintrex GIS-2 Gamma ray spectrometer, installed in a Bell G-4 helicopter, outlined several small radioactive anomalies with maximum readings three times background. These anomalies were systematically studied and sampled in ground surveys. Economically significant uranium mineralization was not found. Trenches made by Snowdrake Ltd. on Apex Hill and at the Apex Village dump were also examined but maximum radioactivity detected in the trenches was equivalent to less than 0.01% U_3O_8. Radioactivity was not detected in the granite core from holes 85 and 25 feet long drilled at the Apex Village dump. A boulder of coarse grained granite gneiss, containing a radioactive garnetiferous vein was discovered in Apex Village earlier by the

[1]District Geologist, Artic Islands Region

Snowdrake group. A chip sample selected from the yellow-stained portion of the vein assayed 0.75% U_3O_8. The boulder may have been transported by ice or derived locally by frost action. In any event the radioactive portion was not considered large enough to warrant further prospecting and the claims were allowed to lapse. This boulder could not be found in 1975.

The present 408 claims were staked for Imperial Oil Ltd. in late 1974.

DESCRIPTION

The rocks of southern Baffin Island comprise a heterogeneous, complexly-folded succession of granite, migmatite and quartz-feldspar gneiss. In some areas crystalline limestone, graphitic schist, quartzite and mafic schist and gneiss are interlayered with the granitic gneiss and migmatite (Blackadar, 1967a).

The claims are underlain by red-brown weathering granite and granite gneiss with rare xenoliths of pyroxenite and marble. There are localized patches of radioactivity in the granitic rocks. Some are as much as 10 feet in diameter and, except for a slightly coarser grain size, appear to be identical to non-radioactive portions of granite.

CURRENT WORK AND RESULTS

The results of detailed geological and radiometric surveys on the claims during the summer of 1975 by Imperial Oil geologists were not encouraging and the claims were allowed to lapse. Most of the radioactive anomalies detected are due to thorium associated with small concordant pegmatites and only two uranium oxide bearing pegmatites were noted. Pyrite and pyrrhotite are common in a rusty gneiss unit.

CAPE DORSET PROJECT	Uranium
Imperial Oil Ltd.	36 B/5, C/7,8
111 St. Clair Ave. West	64°25'N, 76°W
Toronto, Ontario.	

REFERENCES

Blackadar (1959, 1962, 1967a); Laporte (1974a); Maurice (1975, 1977)

PROPERTY

TED 1-37	36 B/5
HEW 1-148	36 C/7
CHO 1-80, MIN 1-81, PIT 1-57	36 C/8

LOCATION

The HEW group is 12 to 18 miles north-northwest of Cape Dorset on southwestern Foxe Peninsula. The other claims are 10 to 25 miles north to northeast of the settlement.

HISTORY

In 1967 Mr. Ross Toms interested the Snowdrake Syndicate in uranium possibilities on Southern Baffin Island and did airborne radiometric surveys on their behalf. Anomalous radioactivity was detected in the Cape Dorset area, and later that year several pegmatites along the coast between Negus and Catherine Bays were examined and sampled.

In 1969 the Kabluna Syndicate obtained several exploration permits in southern Baffin Island, including two in the Cape Dorset area (36 B/5 and C/8). Numerous radioactive anomalies were outlined in the belt of paragneiss, marble, granite and pegmatite between Cape Dorset and Andrew Gordon Bay. The TIM, PAT and DON claims were staked in NTS 36 C/8 (Laporte 1970a, p. 138-139). The most significant find is on the TIM claims where uranium and thorium occur in a zone of biotite paragneiss and concordant granite pegmatite at least 1,900 feet long and from 50 to 250 feet wide. The average grade of 25 selected samples was 1.16 pounds per ton U_3O_8 and 0.54 pounds per ton ThO_2. The highest-grade sample assayed 6.80 pounds per ton U_3O_8 and 1.08 pounds per ton ThO_2. In many places the outcrop surface is heavily stained by secondary uranium minerals. Uraninite is the source of most of the radioactivity in fresh pegmatite samples. Maurice (1977) observed molybdenite in several hand specimens.

DESCRIPTION

Southern Baffin Island consists of a complexly folded generally northwest-trending, succession of granite, migmatite, and quartz-feldspar gneisses which commonly contain layers of diopsidic marble, graphitic schists, quartzites and mafic schists and gneisses. They were last affected by metamorphism 1,650 to 1,750 million years ago during the Hudsonian Orogeny (Blackadar, 1959, 1962 and 1967a).

Northeast of Cape Dorset, radioactivity is associated with pegmatite dykes and sills which intrude all rocks except marble. Radioactivity is associated irregularly with dykes and sills of pegmatite but where these occur together only one of them may be radioactive. Granite and rusty paragneiss also contain radioactive patches.

CURRENT WORK AND RESULTS

In the summer of 1975 Imperial Oil Limited surveyed the area north of Cape Dorset using a helicopter-mounted scintillometer. The five claim groups were staked as a result of this survey. The Geological Survey of Canada did a geochemical orientation survey for uranium and base metal exploration in the same area (Maurice 1975, 1977). It was recommended that both lake waters and sediments be sampled because of erratic variation in lake water alkalinity.

WHITE BAY - TAY SOUND PROJECT	Lead, Zinc
Nanisivik Mines Ltd.	37 G/14, 38 B/4
Suite 100, 300-5th Avenue SW,	72°12'N, 79°25'W
Calgary, Alberta, T2P OL4.	71°56'N, 78°30'W

REFERENCES

Bostock (1964); Geldsetzer (1973a, b); Jackson *et al* (1975); Laporte (1974a)

PROPERTY

AVERK 3-6	37 G/14
TIREAK 1-6, WALRUS 1-12, FOX 1-5, 7-12	38 B/4

LOCATION

The WALRUS, TIREAK and AVERK claims are on Northern Baffin Island, 55 miles south of Pond Inlet, near the southeast tip of Tay Sound. The FOX claims are 50 miles southwest of Pond Inlet at the south end of the east arm of White Bay. The area is part of the Lancaster Plateau (Bostock, 1964).

HISTORY

In early 1970, PCE Explorations Ltd. staked 860 claims, in NTS areas 37 G/14, 38 B/3, 4, 5 and 48 A/8, to cover areas of Society Cliffs Formation in the vicinity of the White Bay Fault (Jackson, 1975) and other northwesterly-trending faults. Apparently no further work was done and the claims lapsed.

In the summer of 1970 geologists from Trigg Woollett and Associates Ltd., working on behalf of King Resources Ltd., did reconnaissance mapping and measured detailed stratigraphic sections with emphasis on the Society Cliffs Formation (Geldsetzer 1973a,b). They also did an airborne EM survey; a reconnaissance geochemical silt survey; prospecting and ground traverses in areas of airborne EM anomalies and anomalous geochemical silt sample values; and ground EM traverses on selected airborne anomalies. The airborne EM survey by Lockwood Survey Corporation Limited located 198 anomalies but only anomaly 409C is believed to be important. A ground survey over this anomaly with a McPhar reconnaissance EM unit indicated that the area is underlain by a poor to moderate conductor with a strike length of at least 2,400 feet. The geochemical silt survey of the White Bay area suggested that there has been remobilization and reconcentration of sulphides along the White Bay Fault which separates Helikian sediments from Aphebian gneisses and granitic rocks. Prospecting of silt sample geochemical anomalies along the fault zone and in other areas failed to locate important sulphide mineralization.

The WALRUS claims were staked in 1974 over anomaly 409C, the other claims were staked in 1975.

DESCRIPTION

About 11,500 feet of Neohelikian strata are preserved in the Milne Inlet Trough of the North Baffin Rift Zone. Dolomite and shales predominate, but there are a few gypsum beds in the middle of the succession. A shallow water shelf environment prevailed during deposition. Hadrynian diabase dykes intrude these strata and the crystalline rocks (Jackson *et al.*, 1975).

The claim groups are underlain by the Society Cliffs Formation, which in the White Bay area, consists of light to medium grey, well bedded dolomite with abundant hemispheroidal stromatolitic structures. The dolomite is rarely brecciated and this differs significantly from the Society Cliffs dolomite west of Tremblay Sound. The Society Cliffs Formation in the White Bay area may therefore be less favourable for the localization of sulphide mineralization.

CURRENT WORK AND RESULTS

EM surveys and a few short drill holes tested the claims. Only minor amounts of possibly syngenetic pyrite were encountered.

CORNWALLIS LEAD-ZINC DISTRICT

In 1975, there was less mineral exploration in the Cornwallis Lead-Zinc District than in the previous year. Cominco Ltd. and Canadian Superior Exploration drilled and did geological, geochemical and gravity surveys on several properties.

The district comprises the northern part of the Cornwallis Fold Belt, a succession of Lower Paleozoic sediments deformed by vertical movements of the underlying Boothia Arch. The Cornwallis Disturbance (Kerr, 1977a) includes four distinct pulses of differential vertical uplift between Early Silurian and Late Devonian time that established the Cornwallis Fold Belt as a north trending anticlinorium.

Kerr (1977b, p. 1402) recognised four controls on mineralization:

"(A) deposits are stratabound within the Ordovician Thumb Mountain Formation; (B) ore occurs in brecciated dolomite, in contrast to usual limestone of the host formation; (C) deposits are located close to shale of the Cape Phillips Formation; and (D) the host formation was subject to erosion and karstification in Early Devonian time during Pulse 3 of the Cornwallis Disturbance."

Kerr (1977b) also proposed a model for lead-zinc deposition which is similar to commonly accepted models of petroleum accumulation.

Most of the showings and occurrences (Fig. III-1) are briefly described in Kerr (1977a) and/or Gibbins *et al.* (1977). Thorsteinsson and Kerr (1968) and Thorsteinsson (1973) have mapped the area.

KAREN CLAIMS	Lead Zinc
Cominco Ltd.	58 F/14
Suite 1700,	74°57'N, 94°53'W
120 Adelaide St. West,	
Toronto, Ontario, M5H 1H1.	

REFERENCES

Kerr (1977b); Gibbins *et al.* (1977); Thorsteinsson and Kerr (1968)

PROPERTY

KAREN 1-20

LOCATION

The KAREN claims are near the headwaters of Taylor River (29, Fig. III-1) immediately east of the MUSKOX claims about eighteen miles north of Resolute Bay.

HISTORY

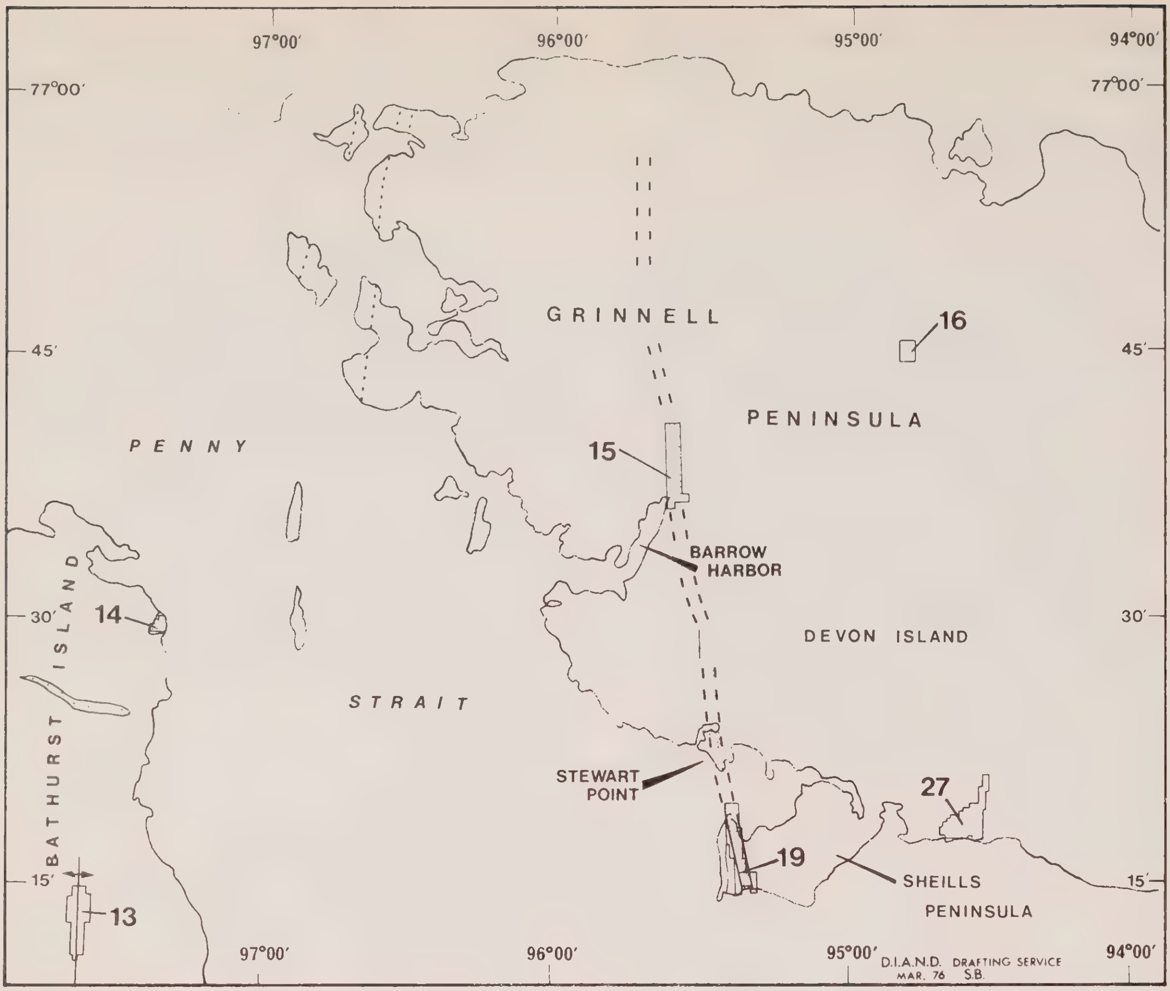
Lead-zinc was discovered near the Taylor River during reconnaissance of Cornwallis Island in 1964, and staked as the MUSKOX group.

DESCRIPTION

Small showings occur in brecciated dolomite within the upper part of an isolated block of the Thumb Mountain formation in the south end of the Centre Anticline (Thorsteinsson and Kerr, 1968). The Disappointment Bay and Snowblind Bay Formations are present in the vicinity but their relationship to the host formation is unknown (Kerr, 1977a).

CURRENT WORK AND RESULTS

The 20 KAREN claims were staked to cover showings found in 1975.



Claim Groups and Geology in the Little Cornwallis District of the Central Arctic Islands

Index Nos.	Property Names	Index Nos.	Property Names	Index Nos.	Property Names	Index Nos.	Property Names
1	VENUS	6	AR*	15	BEARD	24	MUSKOX
2	Polaris Property: POLARIS, TAG, GAR, RID, WEB, MARY, VAT, TWIN, POL	7	ARE*	16	EREBUS	25	MEG
		8	TUKTO	17	LAURA*	26	ROOK
		9	BIG G*	18	TERN*	27	HORNBY
3	COR	10	AQUARIS	19	HECLA	28	NOP
4	LEE	11	GRINCH	20	WALRUS	29	KAREN
5	Eclipse Property: WAL, TUNDRA, ECLIPSE and 49 unnamed claims	12	IDJUK	21	BAC*	30	SUP*
		13	AGPAN	22	BRAN	31	SH*
		14	ORGAN	23	ALL		

Most claims are owned by Arvik Mines or Cominco Ltd. Those marked * belong to Canadian Superior Exploration Ltd.

LAURA AND TERN GROUPS — Zinc, Lead, Copper
Canadian Superior Exploration Ltd. — 58 G/2
Suite 2201, — 75°10'N, 93°48'W
1177, West Hastings Street,
Vancouver, B.C. V6E 2K3

REFERENCE
Kerr (1977b); Thorsteinsson and Kerr (1968).

PROPERTY
LAURA 1-37; TERN 23-43

LOCATION
The LAURA group is just south of Laura Lakes, near the northeast coast of Cornwallis Island. The TERN claims are four miles southwest of the LAURA claims (17 and 18, Figure III-1).

HISTORY
The area was part of Prospecting Permit 289 granted in 1973. The LAURA and TERN claims were staked in 1975.

DESCRIPTION
The eastern side of Cornwallis Island is underlain by an easterly dipping sequence of sediments. The prominent geologic feature of the area is a persistent and sharp facies boundary between the Allen Bay and overlying Read Bay carbonates and the stratigraphic equivalent Cape Phillips shale (Thorsteinsson and Kerr, 1968 and Kerr, 1977b).

Canadian Superior geologists refer to this area as the 'Eastern Facies Front'.

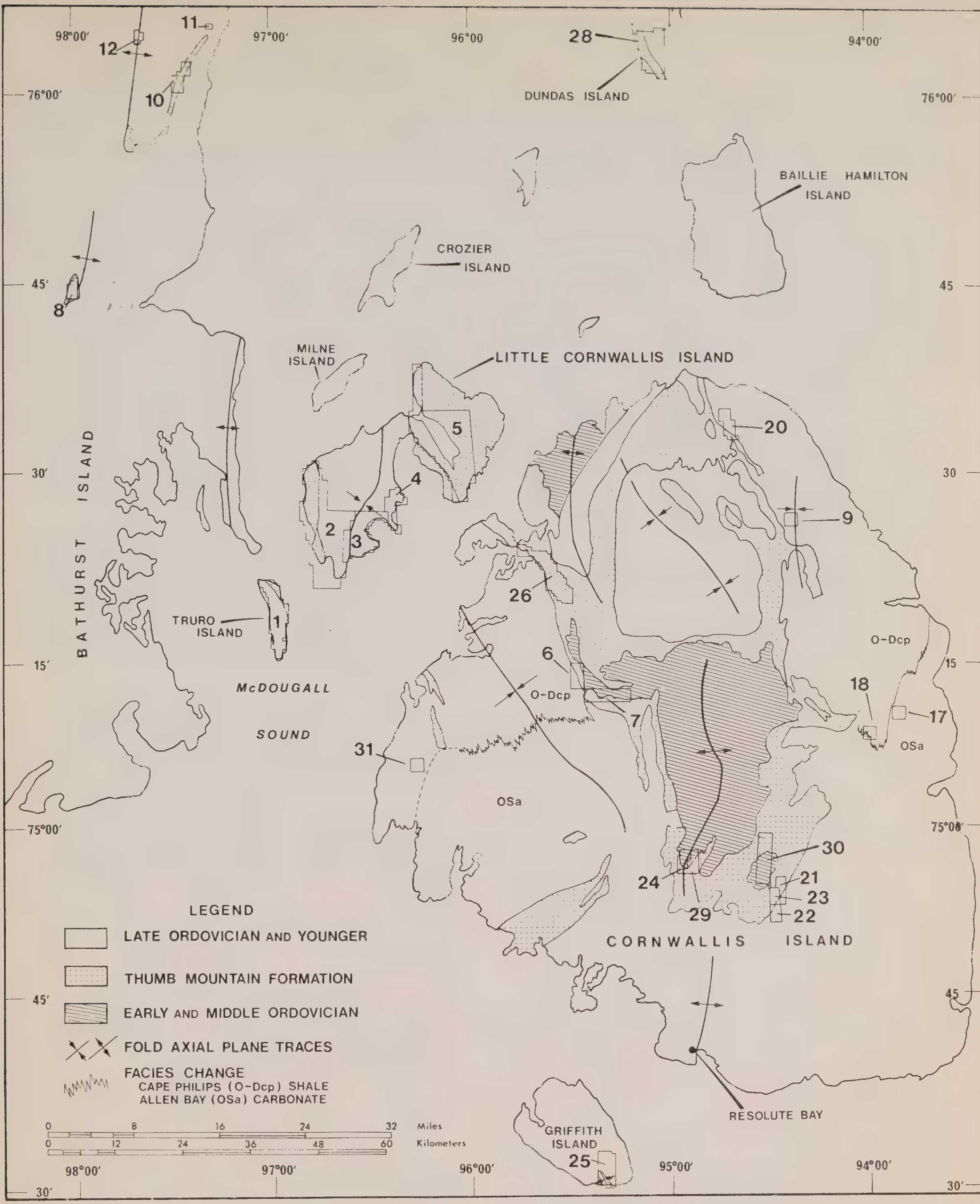


Figure III-1: Geological sketch map showing mineral claims in the Cornwallis Fold Belt. Geology simplified from Thorsteinsson and Kerr (1968) and Thorsteinsson (1973).

Sulphides lie along fractures in carbonates of the Read Bay and Cape Phillips Formations on the LAURA claims.

CURRENT WORK AND RESULTS

An area of 15 square miles was prospected and mapped at a scale of 1:60,000. Sulphides were found along fractures in the Allen Bay dolomite, along fractures and joints and as small, isolated aggregates in the Read Bay limestone and dolomite and in calcite veins within the Cape Phillips crinoidal limestone.

AR, ARE CLAIMS — Lead, Zinc
Canadian Superior Exploration Ltd., — 58 G/4
Suite 2201, — 75°12'N, 95°20'W
1177 West Hastings Street,
Vancouver, B.C. V6E 2K3

REFERENCES

Gibbins *et al.* (1977); Kerr (1977b); Padgham *et al.* (1976); Thorsteinsson and Kerr (1968).

PROPERTY

AR 1-129, ARE 1-23, 25-49, 51-74, 76-99, 101-124, 126-149, 151-174, 176-266.

LOCATION

The claims are along the upper Abbot River, northwest Cornwallis Island (6 and 7, Fig. III-1).

HISTORY

In 1973 Canadian Superior Exploration Ltd. explored the area, Prospecting Permit 291, by prospecting, mapping at a scale of 1:60,000, a geochemical soil and stream sampling survey and 20 miles of gravity survey (Padgham *et al.* 1976). Work continued in 1974 and 13 holes, totalling 9,000 feet, tested gravity anomalies and lead-zinc showings in the Abbot River west area. The AR claims were staked in the Abbot River west area, and the ARE claims in the Abbot River east area, in late 1975.

DESCRIPTION

The AR claims are underlain by a conformable sequence, from uppermost Bay Fiord Formation on the east to basal Cape Phillips Formation on the west. This sequence includes a complete section of Thumb Mountain Formation which can be divided into six well-defined members, Table VI (Gibbins *et al.* p. 41 1977).

The AR claims are on the northeast limb of the Abbot River Syncline (Fig. III-2), immediately north of the junction of the axis of the syncline with the prominent north-trending Rookery Creek Fault and the Cape Phillips to Allen Bay - Read Bay facies change (Thorsteinsson and Kerr, 1968). In the southern part of the area, numerous northeasterly-trending faults, normal to the axis of the Abbot River Syncline give rise to a number of fault blocks and obscure the trace of the Rookery Creek Fault.

The ARE claims adjoin the southeast corner of the Abbot River west area and lie south of the facies change between the Cape Phillips shales to the north and the Allen Bay - Read Bay carbonates to the south (Fig. III-2).

Thumb Mountain strata trend west to northwest, to the east they are cut off by a series of north-northwesterly faults that form part of the north end of the Taylor River graben (Thorsteinsson and Kerr, 1968).

CURRENT WORK AND RESULTS

In 1975, the Abbot River west area was tested by 10 holes totalling 6,975 and the east area by 19 holes totalling 9,040 feet. New showings were discovered at Abbot River east, the grid was extended and mapped and 552 soil samples were collected and analysed for Pb, Zn and Cd. The sulphides are in zones of pseudobreccia in the Thumb Mountain Formation (Kerr, 1977b).

BIG G CLAIMS — Lead, Zinc
Canadian Superior Exploration Ltd., — 58 G/6
Suite 2201, — 75°25'N, 94°20'W
1177, West Hastings Street,
Vancouver, B.C. V6E 2K3

REFERENCES

Kerr (1977b), Laporte (1974b), Thorsteinsson and Kerr (1968).

PROPERTY

BIG G 1-83

LOCATION

The claim group is centred 8 miles southwest of Cape Manning on the northeast coast of Cornwallis Island (9, Fig. III-1).

HISTORY

The area was held under Prospecting Permit 292 from 1973 to 1976 by Canadian Superior Exploration Ltd., under Prospecting Permit 220 from 1970 to 1973 by Bayou Petroleum Ltd. and under Prospecting Permit 53 from 1966 to 1967 by Cominco Ltd. (Laporte 1974b). Two areas of lead-zinc mineralization located by reconnaissance mapping and prospecting were tested by soil geochemistry and gravity surveys in 1974.

DESCRIPTION

Numerous minor lead-zinc-iron showings were found by Thorsteinsson and Kerr (1968) in a structurally complex area at the junction of the Caribou Anticline and the complex DeHaven Anticline (Fig. III-2). The sulphides occur in a brecciated cliff forming member of the Cape Phillips Formation in the Irene Bay Formation and, to a lesser extent, in the Thumb Mountain Formation. The basal member of the Disappointment Bay Formation rests unconformably on all the above units of the Cornwallis Group.

CURRENT WORK AND RESULTS

Additional geochemical and gravity surveys, and detailed and reconnaissance mapping explored the claims in 1975.

NOP CLAIMS (Dundas Island) — Zinc, Lead
Cominco Ltd., — 59 B/3, 4
Suite 1700, — 76°05'N, 95°W
120 Adelaide Street West,
Toronto, Ontario, M5H 1T1.

REFERENCES

Gibbins *et al.* (1977); Kerr (1977b); Thorsteinsson (1973).

PROPERTY

NOP 5-15, 18-26, 29-46, 51-67, 72-87, 92-133.

Figure III-2: Geological map showing relation of the AR and ARE claims, on the Abbot River, Cornwallis Island to the Taylor River Graben, the Abbot River Syncline and to faulting and the intersection of the facies change from Cape Phillips shale to Allen Bay carbonate. Geology from Thorsteinsson and Kerr (1968).

LOCATION

The 113 NOP claims cover most of the western and central part of Dundas Island, 100 miles due north of Resolute Bay and 10 miles south of Shiells Peninsula (28, Fig. III-1).

HISTORY

After the success at Polaris and the discovery of a spectacular showing on Truro Island in 1971, Cominco obtained several prospecting permits in areas of favourable geology. Numerous showings were discovered on Dundas Island and Shiells Peninsula during geological and geochemical surveys in 1972. Additional showings were found in 1973 and gravity surveys explored some of the better showings on Dundas Island. The NOP claims were staked in 1974 before Prospecting Permits 274 and 275 expired.

DESCRIPTION

Showings on the NOP claims on Dundas Island and on the HECLA claims on Shiells Peninsula have a similar geologic setting; both are in brecciated dolomite in the upper part of the Thumb Mountain Formation on the west flank of a long north-trending syncline. The Thumb Mountain Formation is unconformably overlain by the Disappointment Bay Formation and, to the east, conformably overlain by the Irene Bay Formation and black shale of the Cape Phillips Formation, (Fig. III-3). Steep cliffs on the west side of Dundas Island and Shiells Peninsula and the graben structure of many arctic channels suggest a normal fault and a structural and stratigraphic setting similar to that of the Polaris deposit which is on the east flank of an anticline whose core has been down faulted.

There are several showings and geochemical anomalies in a belt of Thumb Mountain Formation along the west side of Dundas Island. The best showing is near the southwest corner of the island where rubble contains numerous highly oxidized high grade lead-zinc boulders. Smithsonite is common in this surficial material.

The chert chip conglomerate member of the Disappointment Bay Formation is abundant and well developed and at one locality contains a gossanous paleosoil weakly mineralized with lead-zinc. In places the conglomerate occupies paleo-depressions that may be sinkholes on the surface of the Thumb Mountain Formation.

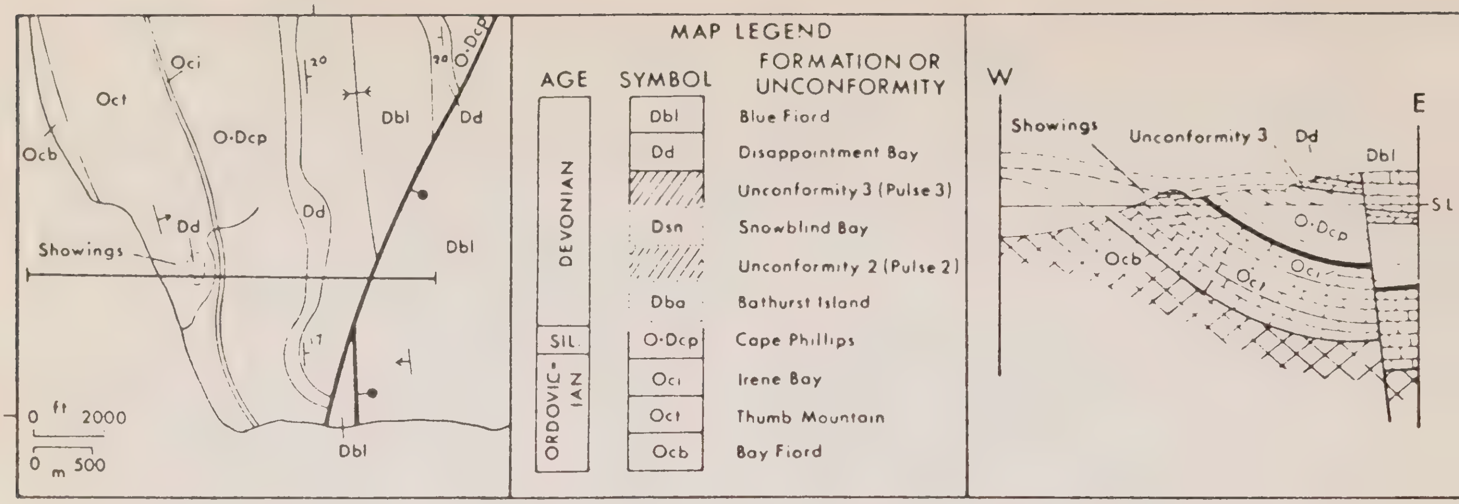


Figure III-3: Geology of Dundas Island (Nop) Showing (from Kerr, 1977b). Shaded areas between formations represent periods of erosion, unconformities were produced by pulses with corresponding numbers.

CURRENT WORK AND RESULTS

Seven holes totalling 14,004 feet were drilled to test a high grade lead zinc showing, a gravity high over the main showing and areas of Thumb Mountain Formation unconformably overlain by the Disappointment Bay Formation. Economic mineralization was not intersected.

The gravity high over the main showing may be due in part to the relatively rugged topography in the area.

GRIN CLAIMS — Copper, Lead, Silver
Cominco Ltd.,
Suite 1700,
120, Adelaide Street West,
Toronto, Ontario, M5H 1H1

59 B/7
76°25'N, 93°47'W

REFERENCES

Gibbins *et al.*, (1977); Kerr (1975, 1977a, b); Morrow and Kerr (1975).

PROPERTY

GRIN 1-4

LOCATION

The GRIN claims are on southeastern Grinnell Peninsula near the isthmus that joins it with the main part of Devon Island and the head of Arthur Fiord (Fig. III-4).

HISTORY

Exploration in 1972 to 1974, by Cominco Ltd. on prospecting permits to the west of the GRIN group discovered several copper, lead and zinc showings in the Silurian Allen Bay and Cap Storm Formations. These were staked as the HORNBY claims in 1974 (Gibbins *et al.*, 1977).

DESCRIPTION

The area of interest is underlain by a conformable succession of Ordovician and Silurian carbonates which are unconformably overlain by the Lower Devonian clastic units shown in Table III-1. Erosion associated

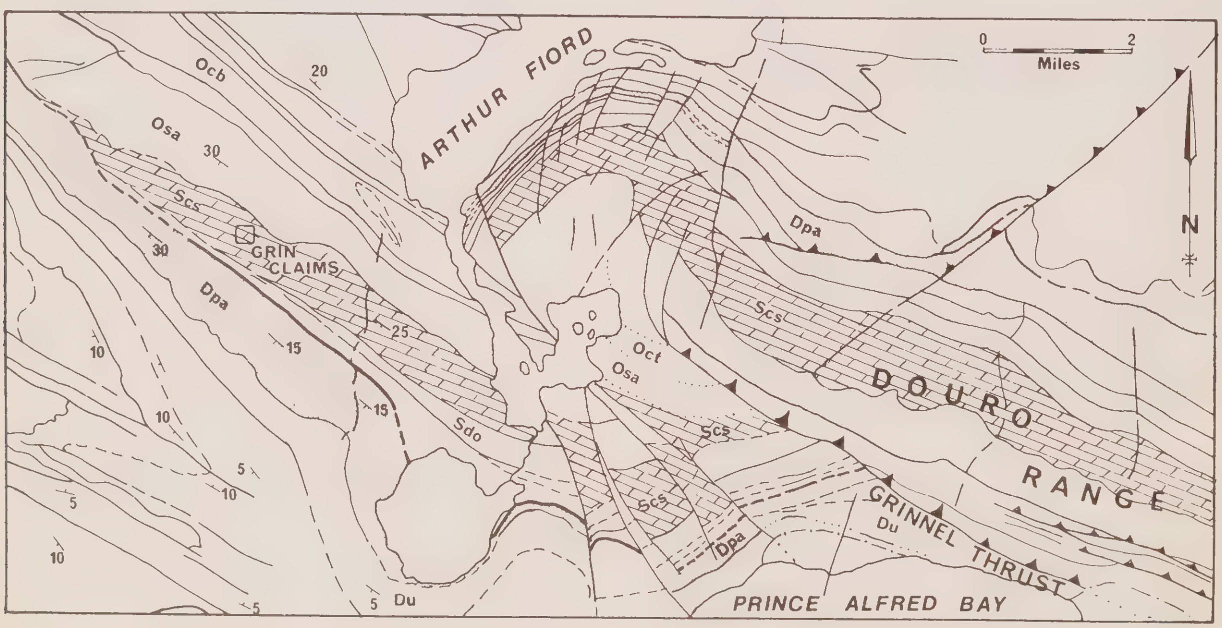


Figure III-4: Geology of the GRIN claims, Devon Island from Morrow and Kerr (1975). The claims are 3 miles west of Arthur Fiord. Symbols given in Table III-1.

with pre-Prince Alfred Formation early Devonian uplift has resulted in partial dolomitization and pseudobrecciation of Cape Storm and Allen Bay Formation carbonates. To the east, in the Duoro Range, these units are conformable. The geologic environment is somewhat similar to that around the Polaris deposit and the Cornwallis Lead-Zinc District (Kerr 1977b), but the claims are in the western Central Ellesmere Fold Belt (Kerr, 1977a) and the facies change to black shale of the Cape Phillips Formation is at least 25 miles to the west. The structure is complex with numerous normal faults trending north to northwest.

The Duoro Range to the east is a large thrust sheet that moved south along the Grinnell Thrust (Fig. III-4).

On the GRIN claims, chalcocite, extensively oxidized to malachite and minor azurite, is disseminated in dolomitized and locally pseudobrecciated rubble of the Cape Storm Formation (Kerr, 1975). A second showing, also in the Cape Storm Formation, contains galena and traces of sphalerite. Dolomitization and mineralization appear to be related to the sub-Prince Alfred Formation unconformity but faults may also be important controls of mineralization.

CURRENT WORK AND ACTIVITIES

In 1975 areas of Cape Storm and Allen Bay Formations north and northwest of Prince Alfred Bay were mapped and prospected. Small showings were discovered, sampled and staked as the GRIN claims.

STANLEY HEAD PROPERTY
Canadian Superior Exploration Ltd.,
Suite 2201,
1177, West Hastings Street,
Vancouver, B.C. V6E 2K3

Lead, Zinc
68 H/1
75°07'N, 96°15'W

REFERENCES

Thorsteinsson and Kerr (1968)

PROPERTY

SH 1-8

LOCATION

The claims are on the west side of Cornwallis Island, seven miles southeast of Stanley Head (31 Fig. III-1).

HISTORY

The area was covered by Prospecting Permit 293 from 1973 to 1976. In 1973 geochemical sampling and prospecting were done on the permit where iron stained areas and barite float were noted. In 1974 detailed mapping and geochemical sampling of two areas underlain by the Thumb Mountain Formation located additional barite but only pyrite was found in the iron stained areas.

DESCRIPTION

The area is dominated by three major north-trending structures; the Graham Bay Syncline, which lies to the east of the Stanley Head Anticline and the Intrepid Bay Graben (Thorsteinsson and Kerr, 1968). Two complexly folded and faulted blocks, are underlain by members of the Thumb Mountain and Cape Phillips Formations and are separated by a recessive weathering gypsum and anhydrite diapir.

CURRENT WORK AND RESULTS

Detailed mapping at 1 inch to 100 feet, soil

TABLE III-I

Formations in the Prince Albert Bay Area, Devon Island

System	Series	Series or Stage	Formation	Lithology
DEVONIAN	UPPER	*FAMENNIAN 353 m.y.* *FRASNIAN 353 m.y.*	Okse Bay (Do)	Sandstone, quarzarenite, yellowish orange and red weathering; abundant large limonite concretions; friable with few outcrops
DEVONIAN	MIDDLE	*GIVETIAN*	Bird Fiord (Dbi)	Fine sandstone and siltstone, calcareous, green weathering, recessive
DEVONIAN	MIDDLE	*EIFELIAN 370 m.y.*	Undivided Devonian Carbonates (Du)	Interbedded limestone, dolomite, anhydrite and sandstone in order of abundance. Limestone and dolomite form resistant bluffs in the upper and lower parts of this unit. In some areas, anhydrite and sandstone form a middle, recessive sub-unit
DEVONIAN	LOWER	*EMSIAN 374 m.y.* *SIEGENIAN 330 m.y.*	Prince Alfred (Dpa)	Sandstone, quartzarenite, yellow weathering and friable, recessive; some areas of thick redbed sequences
DEVONIAN	LOWER	*GEDINNIAN 395 m.y.*	Sutherland River (Dsr)	Dolomite, finely crystalline, buff to white weathering, medium to flaggy beds, resistant
SILURIAN		*PRIDOLIAN*	Devon Island (SDdi)	Organic-rich silty limestone and dolomite, thinly laminated fissile bedding, dark brown but weathers yellowish orange, recessive
SILURIAN		*LUDLOVIAN*	Douro (Sdo)	Limestone, very argillaceous, medium bedded, fairly resistant, greyish green and fossiliferous
SILURIAN		*WENLOCKIAN*	Cape Storm (Scs)	Dolomite and limestone, yellow dolomite and grey limestone interbedded, moderately resistant
SILURIAN		*LLANDOVERIAN 430-440 m.y.*	Allen Bay (Osa)	Dolomite, massive to medium bedded, medium crystalline, sucrosic dolomite, moderately resistant to recessive, brown weathering
ORDOVICIAN	UPPER	*RICHMOND MAYSVILLE EDEN*	Cornwallis Group: Irene Bay (Oci)	Shale, with fossiliferous limestone, greyish green, recessive
ORDOVICIAN	UPPER	*BARNVELD*	Cornwallis Group: Thumb Mountain (Oct)	Limestone, fossiliferous with abundant finely comminuted bioclastic material, medium bedded, grey weathering, resistant
ORDOVICIAN	MIDDLE	*WILDERNESS 445 m.y.* *PORTERFIELD* *ASHBY* *MARMOR*	Cornwallis Group: Bay Fiord (Ocb)	Limestone, finely crystalline, greyish brown to tan, thin bedded; some dolomite, very finely crystalline, olive-grey; occasional shaly zones that are greenish grey; some anhydrite in the lower part of the formation that is very recessive
ORDOVICIAN	MIDDLE / LOWER	*WHITEROCK* *CANADIAN 500 m.y.*	Eleanor River (Oe)	Limestone, pale to medium grey, medium bedded; moderately resistant

Table III-I. Formations in the Prince Alfred Bay area, Devon Island. Map symbols are shown in brackets and are used on the geological map (Fig. III-4). The Thumb Mountain and Irene Bay Formations are combined on the geological map and are shown there as Octi (from Morrow and Kerr, 1975).

geochemistry and two miles of gravity survey explored the southern block. The only anomalies detected were caused by barium concentrations.

POL, LEE AND COR CLAIMS | Lead, Zinc
Arvik Mines Ltd., | 68 H/8
Yellowknife, N.W.T. | 75°25'N, 96°40'W

REFERENCES
Gibbins *et al.*, (1977); Kerr (1977b); Laporte (1974b pp. 70-71); Thorsteinsson and Kerr (1968).

PROPERTY
COR 1-145, LEE 1-58, POL 1-275

LOCATION
The POL, LEE and COR claims are east of, and adjacent to the Polaris lead-zinc deposits on Little Cornwallis Island, 65 miles north-northwest of Resolute Bay (2, 3 and 4 Fig. III-1).

HISTORY
The claims were staked in 1973 to cover ground east of the Polaris deposit.

DESCRIPTION
The claims cover the south end of a northerly trending syncline on the western part of Little Cornwallis Island. This syncline contains more than 2,000 feet of Cape Phillips Formation in its centre and is overlain by small patches of Middle Devonian Disappointment Bay Formation (Thorsteinsson and Kerr, 1968; Kerr 1977b). Strata of the Cornwallis Group, including the favourable Thumb Mountain Formation, lie at shallow depths on the eastern and western parts of the claims.

CURRENT WORK AND RESULTS
Fifteen widely spaced holes, totalling 5,388 feet, were drilled mainly for assessment but also to see if the Thumb Mountain Formation had been brought up by faulting or folding. Economically significant mineralization was not encountered and only the most easterly drill hole intersected the Thumb Mountain Formation.

KIMBERLITE PROJECT | Diamonds
Diapros Canada Ltd., | 58 C/2, 3, 8, 9
28th Floor Toronto Dominion Centre, | 58 D/5, 11, 12
P.O. Box 28,
Toronto, Ontario, M5K 1B8

REFERENCES
Blackadar (1967b); Blackadar and Christie (1963); Clarke and Mitchell (1975); Gibbins *et al.*, (1977); Mitchell (1975, 1976); Mitchell and Clarke (1976); Mitchell and Fritz (1973).

PROPERTY
SKULL 1-9 58 C/2 JOS 1-2 58 C/8

LOCATION
The claims are on Somerset Island. The locations of kimberlite intrusions on Somerset Island are shown on Figure III-5.

HISTORY
The diatreme on the DIAPROS group, a basic intrusion on published maps (Blackadar and Christie, 1963; Blackadar, 1967b), was recognized as kimberlite during a geological survey of Somerset Island by J.C. Sproule and Associates in 1970. It was described by Mitchell and Fritz (1973). Following publication of this paper the DIAPROS claims were staked in April, 1973. Later that summer samples of kimberlite and stream samples were collected and sent to South Africa for analysis and the Batty and Elwin kimberlites were

Figure III-5: Location of Somerset Island Kimberlites (from Mitchell, 1975)

discovered and staked.

In 1974, several kimberlites were identified, staked and sampled during reconnaissance. A mill, designed to produce heavy mineral concentrates, was constructed and operated on the BATTY group. Concentrates from the mill were shipped to laboratories in South Africa. A total of 414 tons of kimberlite from the 6 claim blocks were treated and a few small diamonds were recovered.

DESCRIPTION
Kimberlite pipes cutting lower Paleozoic carbonates that cover most of Somerset Island (Blackadar, 1967) normally appear as distinctive dark coloured patches on air photographs. The pipes are more resistant to erosion than the surrounding rocks and exhibit a slight positive topography. They are covered with a regolith of locally derived relatively unweathered frost shattered kimberlite with small bedrock exposures mainly in the walls of small stream channels.

The petrology and mineralogy of some of the Somerset Island kimberlites are described in detail by Mitchell and Fritz (1973), Mitchell (1975, 1976), Clarke and Mitchell (1975) and Mitchell and Clarke (1976). Mitchell (1976) briefly describes the geology of each of the kimberlites. There is variation from pipe to pipe and even within pipes, some of which are actually multiple intrusions. Olivine, phlogopite and garnet phenocrysts are usually present and easily identifiable; the latter are commonly surrounded by 1-2 mm thick kelyphitic rims. Magnetite, pyroxene, perovskite, ilmenite and carbonate may also be present. The diameter of kimberlites range from less than 100 feet to the more than 2,300 foot diameter main Batty pipe. Some kimberlites are dikes. The kimberlites contain rounded xenoliths of Paleozoic country rock and rounded phenocrysts which, together with the lack of contact metamorphism, suggest emplacement by fluidization.

CURRENT WORK AND RESULTS
In 1975 a magnetometer survey of the JOS kimberlite dikes and the SKULL claims was completed. The results of bulk sampling of the Batty and Elwin sites are not known. The mill at the Batty Creek camp was dismantled at the end of the field season.

WESTERN CHURCHILL PROVINCE AND GREAT SLAVE PLAIN

W.A. Gibbins[1]

D.I.A.N.D., Geology Office, Yellowknife.

Because of the continued concentration of exploration in the Bear and Slave Structural Provinces and the relative decline of activity in the Arctic Islands, responsibility for the Western Churchill Province and the adjacent Great Slave Plains, was transferred to the Arctic Islands Geologist.

WESTERN CHURCHILL PROVINCE

With the exception of the Nonacho Group and related rocks, most of the Churchill Province in the Mackenzie District is a crystalline complex comprising granitic and gneissic rocks which commonly show evidence of a polymetamorphic history. For most of these granitic rocks the last deformation was mainly fracturing, crushing, and in places, mylonitization. Portions of them may be Archean rocks partly remobilized by Hudsonian metamorphism.

The western Churchill Province is studded with lakes which permit access by fixed wing aircraft to within reasonable walking distance of most properties.

Nonacho District

Uranium is associated with granitic rocks and with the Nonacho Group, mainly as pitchblende in narrow fracture-fillings and small veinlets in quartz stockworks. Disseminated chalcopyrite is found along some of the splays of the McDonald Fault System and native silver has been recorded as narrow veinlets in mylonitized rocks adjacent to the southern edge of the East Arm Subprovince.

NICKEL KING CLAIMS	Nickel, Copper
Highwood Resources Ltd.,	75 A/1,2,7 and 8
310, 706-7th Avenue S.W.,	60°16'N, 104°30'W
Calgary, Alberta T2P 0Z1	

REFERENCES
Taylor *et al.*, (1970)

PROPERTY
BANJO 1-32, MUDSTICK 1-15, NICKEL KING 1-3

LOCATION
The Nickel King property is on the southeastern shore of Tha Lake (also called Thoa Lake or Thye Lake), near the northwest corner of Selwyn Lake, 80 miles north-northeast of Stoney Rapids and nearly 400 miles east southeast of Yellowknife.

HISTORY
The property was originally staked as the THA claims. In 1952-1953, Canadian Nickel Company did geological, vertical loop EM and magnetometer surveys and over 11,000 feet of drilling in 18 holes. Thirteen of the holes were drilled at 400-foot centres on the main zone. The sulphides zones intersected, contained low-grade irregular concentrations of nickel and copper. The claims lapsed in 1975.

[1]District Geologist, Arctic Islands Region

DESCRIPTION
The oldest rocks in the area are 1,700 m.y. old, supracrustals metamorphosed to quartzite, hornblende-feldspar gneiss and amphibolite. The claims cover the north end of a series of gabbroic bodies, including diorite and some peridotite, that stretch from Tha Lake to Opescal Lake. The gabbro is medium to coarse grained and locally contains hypersthene in addition to a monoclinic pyroxene. Later granitic intrusives are thought to be responsible for silicification and granitization of the gabbro.

Sulphides, mainly nickeliferous pyrrhotite with less chalcopyrite and very minor pentlandite are disseminated in the gabbro at Tha Lake. The main zone consists of two norite sills; a shallow one, 100 to 175 feet thick that appears to dip 50°, and a deeper sill 175 to 200 feet thick dipping 10-30° south.

The best intersections were:
1.21% Ni .36% Cu over 45 feet, 1.06% Ni .46% Cu over 23 feet, .84% Ni .18% Cu over 55 feet, and .90% Ni .17% Cu over 24 feet.

CURRENT WORK AND RESULTS
During staking of the Nickel King claims by Highwood Resources Ltd. in September, 1975, geochemical and petrographic samples were collected and the geology examined. Samples of gossan material gave anomalous nickel values.

RUM AND SUN CLAIMS	Uranium
Mattagami Lake Mines Ltd.	75 A/6
502, 8215-112 Street,	60°17'N, 105°17'W
Edmonton, Alberta.	

REFERENCES
Taylor *et al.*, (1970)

PROPERTY
RUM 1-40, SUN 1-65

LOCATION
The claims are immediately west of Ingalls Lake, about 60 miles north of Stoney Rapids and 350 miles east southeast of Yellowknife.

HISTORY
Mattagami Lake Mines Ltd. did an airborne radiometric survey, some preliminary geologic mapping and spectrometer surveys and staked the claims in 1974.

DESCRIPTION
The area is underlain by a large block of paragneiss that trends northeast from Northern Saskatchewan (Taylor *et al.*, 1970). Glacial deposits cover at least 70% of the area.

Mapping by Mattagami Lake Mines Ltd. outlined three main rock types: biotite gneiss, granitic gneiss and massive granite. The granites include considerable aplite and pegmatite. Uranium concentrations are found in the granitic rocks at the contact with gneissic inclusions suggesting concentration

during migmatization.

No evidence of faulting or brecciation were found along variously oriented prominent air photo lineaments.

CURRENT WORK AND RESULTS
Geological mapping, and geochemical lake water, humus, and rock sample surveys were done.

Variations in spectrometer readings were related to variations in surficial cover and bedrock type. Four of five anomalies identified by airborne survey coincide with ground spectrometer anomalies on bedrock. Lake water samples with anomalous uranium concentrations were collected from an area with high spectrometric count rates. Results of the humus sampling survey were erratic, possibly because of the complex chemical behaviour of uranium with organic compounds. Radioactive rock samples contained 1.0 to 1.4 lb/ton U_3O_8 and .06 to .08% MoS_2.

TALSTON RIVER RECONNAISSANCE — Uranium
Mattagami Lake Mines Ltd., — 75D, E
502, 8215-112 Street, — 61°N, 111°W
Edmonton, Alberta.

REFERENCES
Darnley and Grasty (1972); Henderson (1939); Wilson (1941).

LOCATION
The Talston River Reconnaissance survey extended east and northeast of Fort Smith, between latitudes 60° and 62° north and longitudes 110° and 112° west.

DESCRIPTION
This area is mainly underlain by gneisses and granites of Hudsonian age with younger Nonacho Lake Group sediments in the extreme east of the area.

CURRENT WORK AND RESULTS
Geochemical sampling and prospecting in 1975 was designed to investigate anomalies identified by a Geological Survey of Canada airborne spectrometer survey, (Darnley and Grasty, 1972).

WS CLAIMS — Uranium
Walter Shupe — 85 A/9
La Ronge, Sask. — 60°36'N, 112°13'W

REFERENCES
Douglas and Norris (1974)

PROPERTY
WS 1-6

LOCATION
The claims are on a large island in the Talson River at the confluence of the Tethul River, 50 miles north northwest of Fort Smith.

HISTORY
A showing was discovered by W. Shupe in 1970 and the claims were staked in 1974.

DESCRIPTION
The WS claims are near the western edge of the Precambrian Shield in an area underlain by Churchill Province gneisses and granites.

CURRENT WORK AND RESULTS
A ground radiometric survey outlined areas of higher radioactivity. Samples from several pits blasted on the claims in 1975, assayed from 0.011 to 0.341% U_3O_8.

Ellice River Area

The Ellice River area was explored in 1967 by the Northwest Syndicate and in 1968 by the Eastern Mackenzie Syndicate (Thorpe, 1972, pp. 120-125). An airborne radiometric survey in 1967 outlined several anomalies in the vicinity of the Ellice River and 564 claims were staked.

In 1968 several prospecting permits were granted and airborne gamma-ray spectrometer surveying, prospecting, trenching and sampling, and preliminary geological mapping were done. The prospecting work was to check airborne anomalies and investigate some of the long gossans in the area. The gossans are associated with metamorphosed sedimentary bands within granitic gneisses and contain pyrite and graphite with minor amounts of chalcopyrite, sphalerite, magnetite and pyrrhotite (Thorpe, 1972, pp. 123).

FRED CLAIMS
Uranerz Exploration & Mining Ltd., — 76 H/14
110-7220 Fischer Street S.E., — 65°57'N, 105°11'W
Calgary, Alberta, T2H 2H8.

REFERENCES
Thorpe (1972)

PROPERTY
FRED 1-87

LOCATION
The claims immediately west and northwest of Freddy Lake, near the upper Ellice River are 140 miles south southeast of the settlement of Bathurst Inlet, and 345 miles northeast of Yellowknife.

HISTORY
The Freddy Lake radioactive zone was originally staked as the A claims in 1967 (Thorpe, 1972). In 1968 an airborne survey outlined a broad radioactive zone one to two miles wide that extends 8.5 miles north from just west of the south end of Freddy Lake.

In July, 1974, Uranerz Exploration and Mining Ltd. flew a radiometric survey and staked the FRED claims.

DESCRIPTION
The area is 40 miles east of the Bathurst Trench and is underlain by pink quartz biotite gneiss and by minor amounts of other rock types. The main radioactive zone on the claims is 400 feet wide and extends 15,600 feet north from near the north tip of Freddy Lake (Thorpe, 1972). The zone is about 95% covered by glacial drift and boulder fields. Trenching and sampling in a small area at the south end of the zone exposed radioactive mineralization in narrow bands of metamorphosed bedded rocks that are concordant with the granitic gneiss. These strike 005° and dip 60°W. A narrow, radioactive, sheared, feldspar porphyry dyke strikes northerly and dips 85°W. A radioactive brick red, felsite dyke strikes 170° and dips 45°E. The Northern Miner (Sept. 19, 1968, pp.17) reported that assays as high as 0.3% U_3O_8 were obtained for samples from this zone.

CURRENT WORK AND RESULTS

Mapping and ground radiometric surveying of a 3,000 by 600 metre area on the west side of Freddy Lake indicate that the quartz-biotite gneiss has higher than normal radioactivity but no concentrations of uranium were detected.

WOLF GROUP
Uranerz Exploration and Mining Ltd.,
110-7220 Fischer Street S.E.,
Calgary, Alberta, T2H 2H8

76 I/3, 6, 7
66°15'N, 105°03'W

REFERENCES

Fraser (1964, 1968); Thorpe (1972).

PROPERTY

WOLF 21-24, 27-50

LOCATION

The WOLF group is a mile or two northwest of Wolf Lake near the Ellice River, 360 miles northeast of Yellowknife, about 22 miles north of the FREDDY claims.

HISTORY

The area, 76 I/6, is one of several permit areas held by the Eastern Mackenzie Syndicate in 1968 (Thorpe, 1972, pp. 120-123).

A radiometric survey was flown in the Wolf Lake area by Uranerz Exploration and Mining Ltd. in 1974. Fifty claims staked northwest of Wolf Lake in 1975 by Saratoga Exploration were transferred to Uranerz Exploration and Mining Ltd.

DESCRIPTION

The claims are in the Churchill Province, 50 miles east of the Bathurst Trench. They are underlain by radioactive quartz-biotite gneiss which is exposed over 20% of the claims area. A north-trending zone of anomalous radioactivity has been traced for about 5,500 feet. Radioactivity is concentrated in black chlorite schist bands, and in the centre of a banded pink aplite dyke (Thorpe, 1972).

CURRENT WORK AND RESULTS

In 1975 the WOLF claims were mapped and surveyed with a Sprat SPP2 scintillometer. Counts as high as 500 per second were obtained but the results indicate a low uranium potential in the area.

LYN AND PRN CLAIMS
Cominco Ltd.,
200 Granville Square,
Vancouver, B.C. V6C2R2

Copper, Nickel
66 M/9
67°40'N, 102°10'W

REFERENCES

Blake (1963); Fraser (1964); Heywood (1961); Laporte (1974b); Padgham *et al.*, (1976); Gibbins *et al.*, (1977).

PROPERTY

LYN 1-130; PRN 1-41.

LOCATION

The property is at the mouth of the Perry River, near the Arctic Coast.

HISTORY

Giant Yellowknife Mines Ltd. and the Dragon Syndicate discovered a train of boulders mineralized with nickel and copper in 1970 (Laporte, 1974b). Perry River Nickel Mines, Giant Yellowknife Mines and Cominco Ltd. have tried to find the source of the mineralized boulders (Padgham *et al.*, 1976 and Gibbins *et al.*, 1977). The claims were optioned to Cominco Ltd. at the beginning of 1974.

DESCRIPTION

Granitic gneisses of Archean age with bands of iron-formation and mafic gneiss underlie the claims. Gneissic layering trends east to east-northeast, and dips steeply to gently south. Steep south-southeasterly dips prevail along the boundary of the LYN and PRN claims blocks.

Norite and a few pyroxenite boulders, containing chalcopyrite, pyrrhotite, violarite, pentlandite, magnetite and pyrite are found in a two mile long boulder train. Similar mineralization is found locally in norite dykes.

CURRENT WORK

Cominco Ltd. drilled two holes, 378 and 395 feet long, near the head of a boulder train on PRN 39 to test a north trending EM conductor which is about 600 feet long. A third hole near the south end of the conductor was abandoned at 108 feet. An amphibolite dyke contains 0.65 to 0.85% nickel, 0.25 to 0.95% copper and 0.01 to 0.10 ounce per ton platinum over true widths of 2.5 to 4.0 feet.

The narrow mineralized dyke lies sub-parallel and about 100 feet west of a thicker, barren, altered norite dyke, which was penetrated by one hole.

Cominco Ltd. terminated their option agreement with Perry River Nickel Mines in 1976.

THE GREAT SLAVE PLAIN

The Great Slave Plain occupies the north central part of the Interior Plains, between latitudes 60 and 64°N and between the Franklin Mountains and the western edge of the Precambrian Shield in the vicinity of Great Slave Lake (Bostock, 1964). The Plain developed mainly on Paleozoic carbonates, has a relatively flat surface, generally less than 1,000 feet in elevation. It is characterized by scarce outcrop, abundant swamp and, locally, by sink holes and karst topography. The Horn Plateau, which consists of Mesozoic strata, is a broad smooth knoll rising to 2,500 feet.

The Great Slave Plain includes the Pine Point Lead Zinc District, the source of more than three quarters of the Northwest Territories annual mineral production. Because of extensive overburden, the flat lying attitude of the host rocks, and the nature of Pine Point type mineralization, exploration is mainly by IP surveys and fence or grid drilling. Attempts to locate mineralization using rock and soil geochemistry, gravity and EM surveys have not been very successful. Most work is done in the winter months when the widespread swamps and muskegs are frozen.

Pine Point Mines Ltd., the only mining operation in the area, employs several hundred people, mills about four million tons per year and spends nearly two million dollars per year exploring their extensive mineral holdings. Most of their exploration is on patented mineral leases and the results are not normally reported as assessment work.

PINE POINT ASSESSMENT DRILLING — 85 A/13, B/10,15,16
Pine Point Mines Ltd., — 62°42' to 62°58'N,
Pine Point, N.W.T. — and 114° to 115°W

REFERENCES
Douglas and Norris (1974); Gibbins *et al.*, (1977); Norris (1965); Padgham *et al.*, (1976); Skall (1975).

PROPERTY
The claims involved in the 1975 assessment drilling are listed in Figure IV-1 on page 37.

LOCATION
All of the assessment is done in peripheral areas of Pine Point Mines Ltd. property (Figure IV-1).

HISTORY
The claims were staked at various times since 1967 peripheral to the Pine Point Mines Ltd. property.

A summary of 1973 and 1974 assessment drilling is given in Padgham *et al.* (1976, pp. 63-68) and Gibbins *et al.* (1977, pp. 170-175).

DESCRIPTION
The Pine Point area is underlain by several hundred feet of Middle Devonian strata that dip gently southwest at about 20 feet per mile (Norris, 1965 and Douglas and Norris, 1974). A north-westerly trending reef complex is contained in the sequence and most of the original Pine Point orebodies are in a coarse grained secondary dolomite facies, known as the Presqu'ile Formation, that is spatially related to the reef complex. However, most of the present reserves lie outside the Presqu'ile dolomite (Skall, 1975). The X-15 deposit in a collapse structure in the back reef area and the large tabular bedded N-204 deposit in deeper strata are examples of mineralization outside the Presqu'ile Formation. Drilling in the eastern part of the area (Figure IV-1) in the vicinity of Paullete Creek and the N-204 and X-15 represents an attempt to discover more of these types of deposits. Drilling on the south and western parts of the property probed the Presqu'ile Formation along the extensions of the various hinge zones.

CURRENT WORK AND RESULTS
No significant mineralization was encountered in any of the assessment drilling recorded.

GREAT SLAVE REEF PROJECT — Lead, Zinc
Western Mines Ltd. — 85 B/11-14
1103, 595 Burrard Street, — 60°45'N, 115°10'W
Vancouver, B.C. V7X 1C4

REFERENCES
Douglas and Norris (1974); Norris (1965); Skall (1975).

PROPERTY
1,300 AX claims and 1,306 WD claims

LOCATION
The AX group covers a 10 by 10 mile area, straddling N.W.T. Highways between the Buffalo River and Pine Point Mines claims on the east and Birch Creek on the west (Figure IV-1). The adjacent WD claims form a block 6 miles wide by 16 miles long between Birch Creek and Hay River.

HISTORY
Most of the area had been staked between 1965 and 1967, during a staking rush related to the start of production at Pine Point. However, the favourable stratigraphic units are too deep to be explored with conventional geophysics and little exploration was done.

During March and April, 1975, Western Mines Ltd. acquired the AX claims and entered a joint venture with Dupont of Canada Exploration Limited to explore them. The WD claims were staked early in 1976.

DESCRIPTION
The 'Main Hinge Zone', along which many of the mineral deposits in the Pine Point district lie (Figure VII-1, page 112), extends westward across the AX and WD claims at a depth of several hundred feet. This zone corresponds closely to the Devonian Pine Point barrier reef complex (Figure VII-3, page 113) which passes into time equivalent evaporites of the Muskeg Formation and tidal flat deposits (J Facies of Skall, 1975) to the south, and deep water shales to the north. The initial exploration goal is to outline the reef complex, now largely altered to coarse grained dolomite known as Presqu'ile Facies.

According to Skall (1975) differing rates of subsidence between adjacent areas in the Middle Devonian created penecontemporaneous faults or hinge zones that were accompanied by slumping of unconsolidated sediments and fracturing and faulting of lithified material. Thus the hinge zones were instrumental in Barrier Complex facies development and they remained lines of weakness localizing renewed movements. They were enhanced during paleokarst development, served as conduits for magnesium rich brines which formed the Presqu'ile dolomite and localized lead-zinc deposition.

CURRENT WORK AND RESULTS
Diamond drilling begun on the property in November, 1975 was temporarily halted in April, 1976 because of spring break-up. During this period, 72 holes totalling 42,612 feet were completed and the WD claims were staked.

Initial or Phase I drilling designed to outline and define the trend of the Main Hinge Zone consisted of thirteen holes drilled at 3,000 foot intervals along wide-spaced lines perpendicular to the projected trend of the Main Hinge. Six holes were drilled for assessment purposes.

Phase II drilling was designed to evaluate the extent of mineralization within the Main Hinge Zone. Forty holes were drilled on 1,000 foot centres on lines 2,500 feet apart. Ten of these holes intersected mineralization.

PHASE II DRILLING

Hole No.	Length of Intersection	% Pb	% Zn
4	9.0	0.05	1.25
11	7.0	1.94	0.65
13	6.0	0.01	5.43
19	21.0	0.18	5.80
25	17.0	2.16	20.36
23	28.0	0.05	0.30
35	2.0	9.05	0.15
39	9.0	0.52	1.75
47	30.0	0.02	1.48
56	5.5	0.01	1.70

DIAMOND DRILL HOLES REPORTED BY PINE POINT MINES LIMITED

DDH No.	Claim	Depth	NTS	Areas
3251	TC 50	335	85 A/13	Paulette Creek
3252	TC 50-54	275		"
3253	TC 55	297		"
3254	TC 21-22	445		"
3270	SAND 62-63	895	85 B/10	Southeast Fort Smith Junction
3271	SAND 29-30	880		"
3272	SAND 72	915		"
3273	SAND 87-88	995		"
3287	LS 7	637	85 B/15	On east bank of Buffalo River
3256	LF 11-12	478	85 B/16	South of N 204
3257	LF 29	325		"

DDH No.	Claim	Depth	NTS	Areas
3258	ZOT 32	362	85 B 16	Southwest of N 204
3259	ZAP 17	380		"
3260	ZAP 8	405		"
3261	ZAP 7	370		"
3262	DUVL 10	363		"
3263	DUVL 54-55	640		"
3264	JEAN 65-66	782		Southwest of X15
3265	TK 9-21	787		"
3266	KL 2-15	550		"
3267	KL 35-36	560		"
3268	TAN 113	560		"
3269	TAN 80-91	795		South of airport

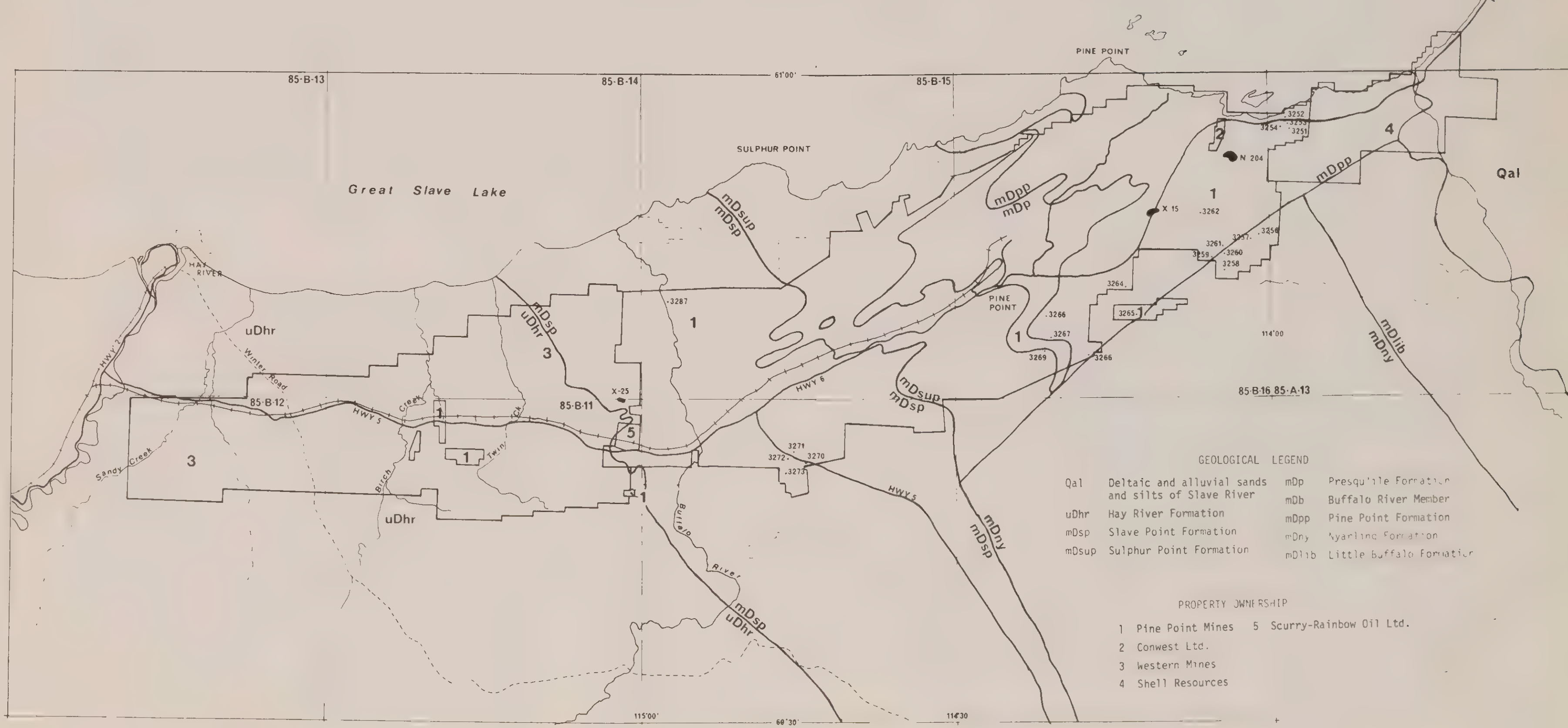


Figure IV-1: Geological sketch map of the Pine Point mineral belt showing locations of diamond drill holes drilled for assessment credit by Pine Point Mines Limited, property ownerships as of January 1977, and the location of Western Mines X-25 deposit. The holes drilled by Pine Point Mines Limited represent a small part of the total exploration and development drilling in the Pine Point Area by Pine Point Mines Limited. Geology from Douglas and Norris (1974).

PHASE III DRILLING

D.D.H.	Location	Mineralized Intersection Depth	Length	% Pb	% Zn
25	-	442-459	17.0	2.16	20.36
61	200' south 25	438-465	27.0	0.54	5.30
67	400' south 25	453-460.5	7.5	1.58	14.52
		403-423	20.0	2.70	4.20
65	200' west 25	423-437	14.0	Trace	Trace
		437-457	20.0	1.44	6.01
		360-376	16.0	7.67	7.66
		376-418	42.0	15.17	28.49
71	400' west 25	418-474	56.0	2.88	11.32
		360-474	114.0	8.07	17.13
63	200' north 25	Barren			
69	200' east 25	Barren			

LOCATION

The claims are south of Falaise Lake, between Slave Point and Windy Point on the northwest shore of Great Slave Lake, 55 miles east of Fort Providence and 60 miles northwest of the town of Pine Point.

Access is by air, boat and winter road.

HISTORY

In 1955 over 2,000 claims were staked near the west shore of Great Slave Lake west of Caribou Point, Sulphur Bay and Windy Bay and around Falaise and Prairie Lakes and east of Boulogne Lake. Most of these were staked by the Windy Point Mining Company (McGlynn, 1971). In 1956, the claims were geochemically prospected, mapped at a half mile to the inch

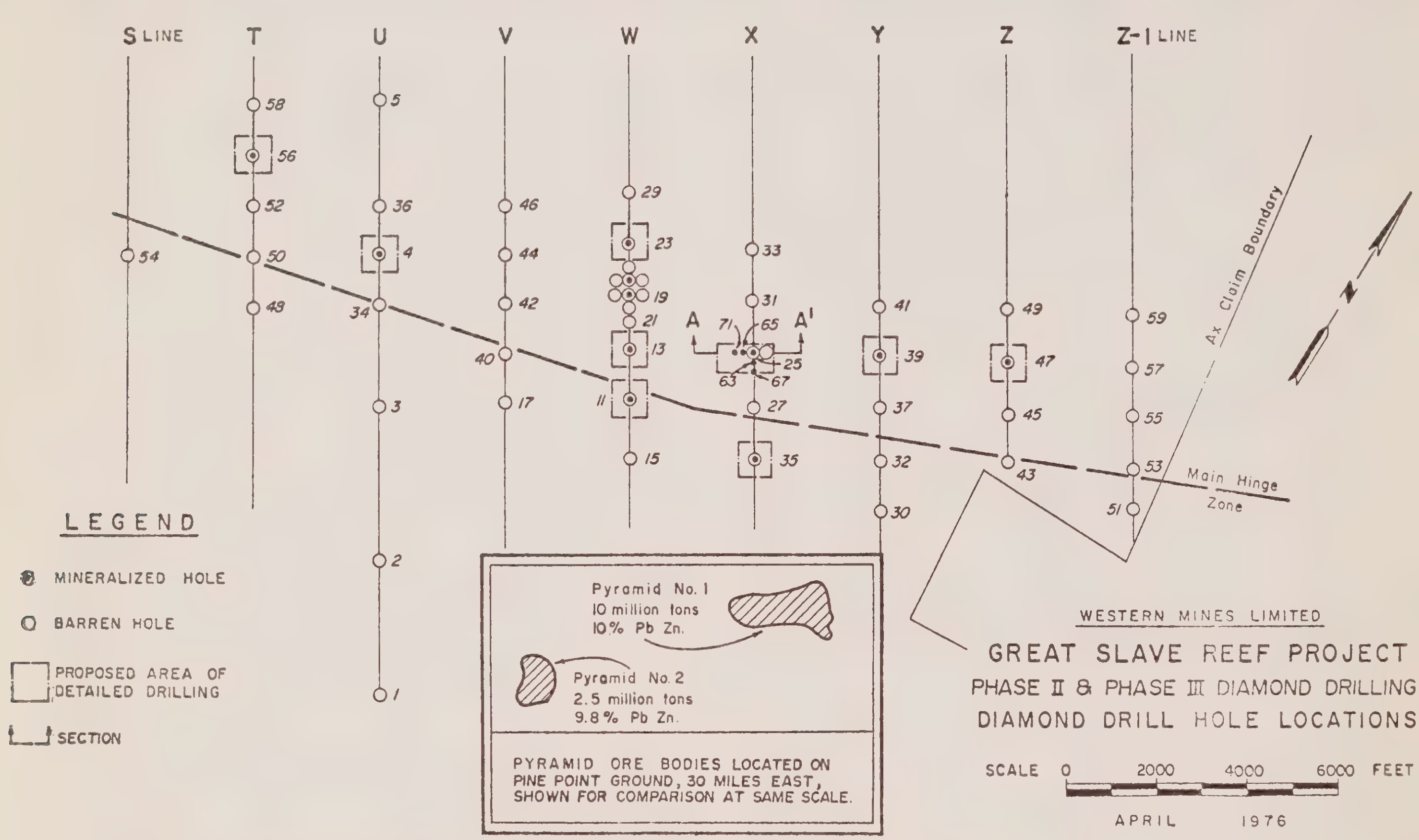


Figure IV-2: Location map of Phase II and III drilling on Western Mines Great Slave Reef Project.

Phase III drilling was done on 100 to 200 foot centres around mineralized intersections encountered in Phase II drilling. Phase II and III hole locations are shown in Figure IV-2 and the results of Phase III drilling in the vicinity of discovery hole D.D.H. 25 in table above.

SLAVE POINT - WINDY POINT PROJECT — Lead, Zinc
Pine Point Mines Ltd., — 85 G/4,5, F/1,8
Pine Point, N.W.T. — 61°15'N, 116°W

REFERENCES

Cameron (1918); Douglas (1974); Douglas and Norris (1974); McGlynn (1971); Norris (1965); Skall (1975); Thorpe (1966); Williams (1977).

PROPERTY

GH 1-7; HA 1-687 and 36 MARY claims

and 20,000 feet were drilled in about 120 holes (Figure 8 after Norris, 1965). Most of the holes were short and only penetrated to the base of the Presqu'ile dolomite. Lead-zinc mineralization encountered in a number of holes, was not economic and closely spaced drilling failed to outline zones of significant size.

In 1965, Elgin Petroleum Corp., a subsidiary of Rayrock Mines Ltd., did an IP survey and 4,995 feet of drilling in 24 holes on the LIP and LOT groups on the south shore of Windy Bay (Thorpe, 1966, p.30). At that time Consolidated Mining & Smelting Co. did IP and 3,941 feet of drilling in 20 holes on 350 PIP claims, east of Prairie Lake and west of Windy Point.

DESCRIPTION

A major northeast-trending graben that underlies

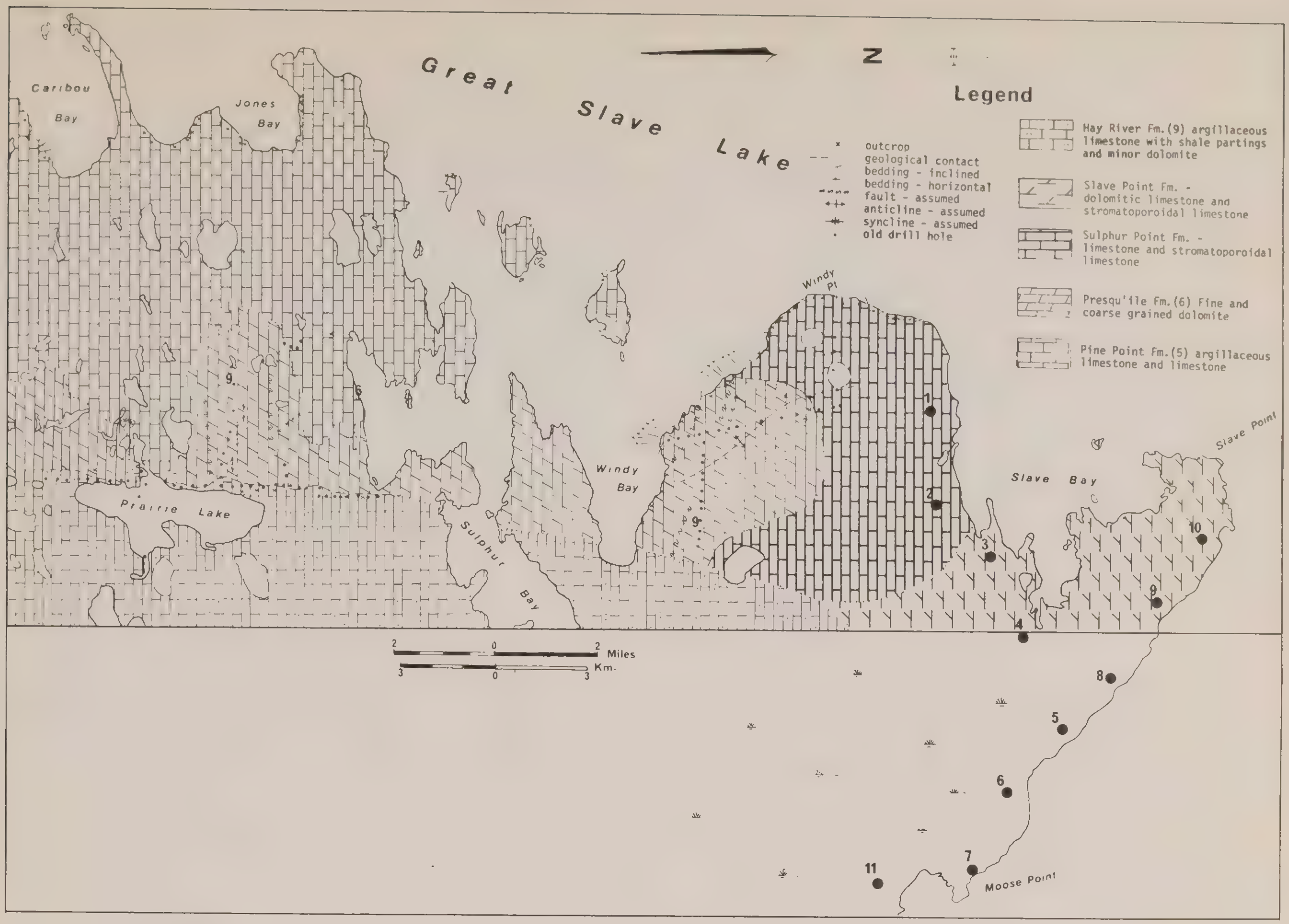


Figure IV-3: Geology of the Slave Point-Windy Point area on the west side of Great Slave Lake (from Norris, 1965). Holes drilled in 1975 and locations shown as ●.

the west end of Great Slave Lake separates the Slave-Windy Point area from Pine Point (Douglas, 1974 and Douglas and Norris, 1974). The geology of the two areas is similar in most respects and has been summarized as follows by Williams (1977, p. 7):

> "Slave Point is a prominent geographic feature on the north shore of Great Slave Lake, after which the Slave Point Formation was named. A few kilometres to the north is Windy Point (Figs. 14, 15), where there is an extensive exposure of a reef-like mass of carbonate, in part altered to coarsely crystalline dolomite. (The Presqu'ile Formation.) The reef-complex is identical, lithologically, with the ore-bearing reef-complex at Pine Point, with which it has always been correlated (Cameron, 1918; Norris, 1965). —
>
> — In the past, the Presqu'ile Formation has been considered to be a time-rock unit - a facies of the Sulphur Point Formation - lying between the Slave Point carbonate above and the Pine Point carbonate below (see Norris, 1965, Figs. 3, 6). It is now becoming increasingly evident that the Presqu'ile-type dolomite (i.e. very coarse dolomite) is a diagenetic facies not limited to any definite horizon or any one original type of carbonate (Skall, 1975). In the Slave River map-area, the Presqu'ile facies is found at any horizon from the Keg River platform to high in the Slave Point Formation. Furthermore, the Presqu'ile facies tends to migrate up-section from south to north. Along the carbonate front in the Slave River map-area, there are several wells where the Slave Point is, in part (in one case entirely), altered to a Presqu'ile facies, some 60 m (200 ft.) stratigraphically higher than the position of the Presqu'ile facies at Pine Point."

There is no evidence of major faulting but a number of minor faults are found cutting the Paleozoic rocks. These faults strike west-northwest and west and have small displacements.

Most of the sulphide mineralization occurs in the coarse replacement dolomites in the reef structure. Galena and sphalerite are found as isolated crystals, in seams, as disseminated grains or irregular patches in the coarse dolomite, or as veinlets in brecciated fine-grained dolomite. Pyrrhotite and chalcopyrite are sometimes associated with the other sulphides. In all the formations pyrite, galena and sphalerite are sometimes found as replacements of calcite-filled fossils. Sulphides are disseminated through the coarse portions of the Presqu'ile Formation but no concentrations of economic interest were outlined by the drilling. (McGlynn, 1971, p. 162)

CURRENT WORK AND RESULTS

During July and August of 1975, 72 claims were staked, 4,706 feet were drilled in 11 holes (Fig. IV-3) and areas of scattered outcrop near Prairie Lake and Windy Point were mapped. Significant mineralization was not encountered in any of the holes.

THE MACKENZIE REGION

J.B. Seaton[1]

D.I.A.N.D., Geology Office, Yellowknife

The Mackenzie Region (Fig. I-1) during 1975 comprised the Bear and Slave Structural Provinces.

THE BEAR STRUCTURAL PROVINCE

The Bear Province (Fig. V-1) comprises rocks of Aphebian to Hadrynian age. Aphebian, predominantly sedimentary sequences flank the Slave Province; to the northeast, the intracratonic Kilohigok Basin, with its greatest thickness of sediments preserved in the Bathurst Trench; to the southeast, the Athapuscow aulacogen (Hoffman, 1977); to the northwest, shelf and clastic sediments of the Epworth Group underlie a 50 mile wide zone extending 150 miles south from the Coronation Gulf. Farther south along the western margin of the Slave Province there are patches of clastic sediments and volcanics of the Snare Group.

West of the Epworth Group, and of the main exposure of the Snare Group, the mesozonal Hepburn Metamorphic-plutonic Belt and associated metamorphosed supracrustal rocks, extend southwards from the vicinity of the Paleohelikian Muskox Intrusion, for roughly 225 miles, to near the northern extremity of Great Slave Lake. The Hepburn Metamorphic-plutonic Belt is flanked to the west by the Great Bear batholith, an epizonal complex comprising three volcanic sequences intruded by co-magmatic granitic rocks. Helikian sediments of the Amundsen Basin unconformably overlie the Goulburn Group rocks of the Kilohigok Basin. The late proterozoic rocks extend southwards along the axis of the Bathurst Trench. Northerly dipping Neohelikian sediments of the Dismal Lakes, Coppermine River and Ray Groups unconformably overlie Paleohelikian sediments of the Hornby Bay Group and constitute the Coppermine homocline. Late Proterozoic rocks at the mouth of Bathurst Inlet include basalts and sediments of the Coppermine River Group.

During the late nineteen sixties the basalts of the Coppermine River Series (Fraser, 1964) and those of the presumably correlative Coppermine River Group (Baragar and Donaldson, 1973) were extensively explored for fracture controlled copper mineralization particularly in the area south of Coppermine.

Properties in the Bear Province have been treated under the following subheadings: East Arm Sub-Province, Kilohigok Basin, Great Bear Batholith (including Camsell River and Echo Bay silver districts) and Amundsen Basin.

With a few exceptions, uranium was the 1975 exploration target in the Bear Province outside the two silver districts.

References relating to individual property descriptions are listed separately in the appropriate sections. General information on the Bear Province and detailed reports on mapping of specific areas of the Bear Province include those by:

Allan and Cameron (1973); Badham (1972); Baragar and Donaldson (1973); Campbell (1978); Campbell and Cecile (1975); Cecile and Campbell (1977); Fraser (1964, 1974); Fraser *et al.* (1970, 1972); Grasty and Richardson (1972); Henderson, J.F. (1949); Hoffman (1973, 1978); Hoffman and Bell (1975); Hoffman and Henderson (1972); Hoffman *et al.* (1970, 1977a, 1977b, 1978); Hoffman and Cecile (1974); Hoffman and McGlynn (1977); Kidd (1936); Kindle (1972); Lord (1941, 1942, 1951); Lord and Parsons (1952); McGlynn (1957, 1974, 1975, 1976, 1977); McGlynn and Ross (1962); Murphy and Shegalski (1972); Mursky (1967, 1973); Padgham, Shegalski *et al.* (1974); Richardson *et al.* (1973, 1974); Robinson (1971); Robinson and Ohmoto (1973); Ross (1959, 1966); Shegalski (1973); Shegalski and Thorpe (1972); Smith (1962, 1967); Thorpe (1970); Tremblay (1971); Wilson and Lord (1942); Yeo (1976).

EAST ARM SUBPROVINCE

Five projects explored a total of 13 claim groups in the East Arm Sub-province during 1975. These are listed in Table V-1.

Table V-1

PROPERTIES EXPLORED IN 1975

NAME	NTS	COMMODITY
FLY, MAID, MER	75 K/11	Uranium
BBX, JDA, GUN	75 L/2	Cobalt, Copper
COGO	75 L/7	Copper
EMR, JSD, SOS, RHT, HK, HECK	75 L/8	Uranium

The East Arm subprovince comprises Proterozoic sediments, volcanics and intrusives emplaced in an aulacogen (Hoffman *et al.* 1977a, b). The Wilson Island Group may be related to an early stage of rifting (Hoffman, 1977a; Yeo, 1976). The Group has been metamorphosed to greenschist and locally amphibolite grade, in which respects it differs from the uncofmably overlying Great Slave Supergroup. The Wilson Island Group includes a platformal cross-bedded facies and a turbidite facies, extensive basalt and rhyolite and intrusive adamellite stocks and dykes. The unconformably overlying Great Slave Supergroup includes sediments of trough and platformal facies deposited respectively within or adjacent to the Athapuscow aulacogen. Volcanics of the Great Slave Supergroup are mainly confined to the aulacogen and comprise pillowed basalts of the Union Island Group to felsic volcanics of the Seton Formation and columnar basalts of the Pearson Formation.

During the later stages of deposition of the Great Slave Supergroup the Stark Formation megabreccia was formed probably as a result of solution of salt beds originally present in the lower part of that formation and the collapse of overlying beds (Hoffman *et al.* 1977a, 1977b). A stratigraphically correlative olistostrome (Campbell and Cecile 1975, 1976) in the Kilohigok Basin could have a similar

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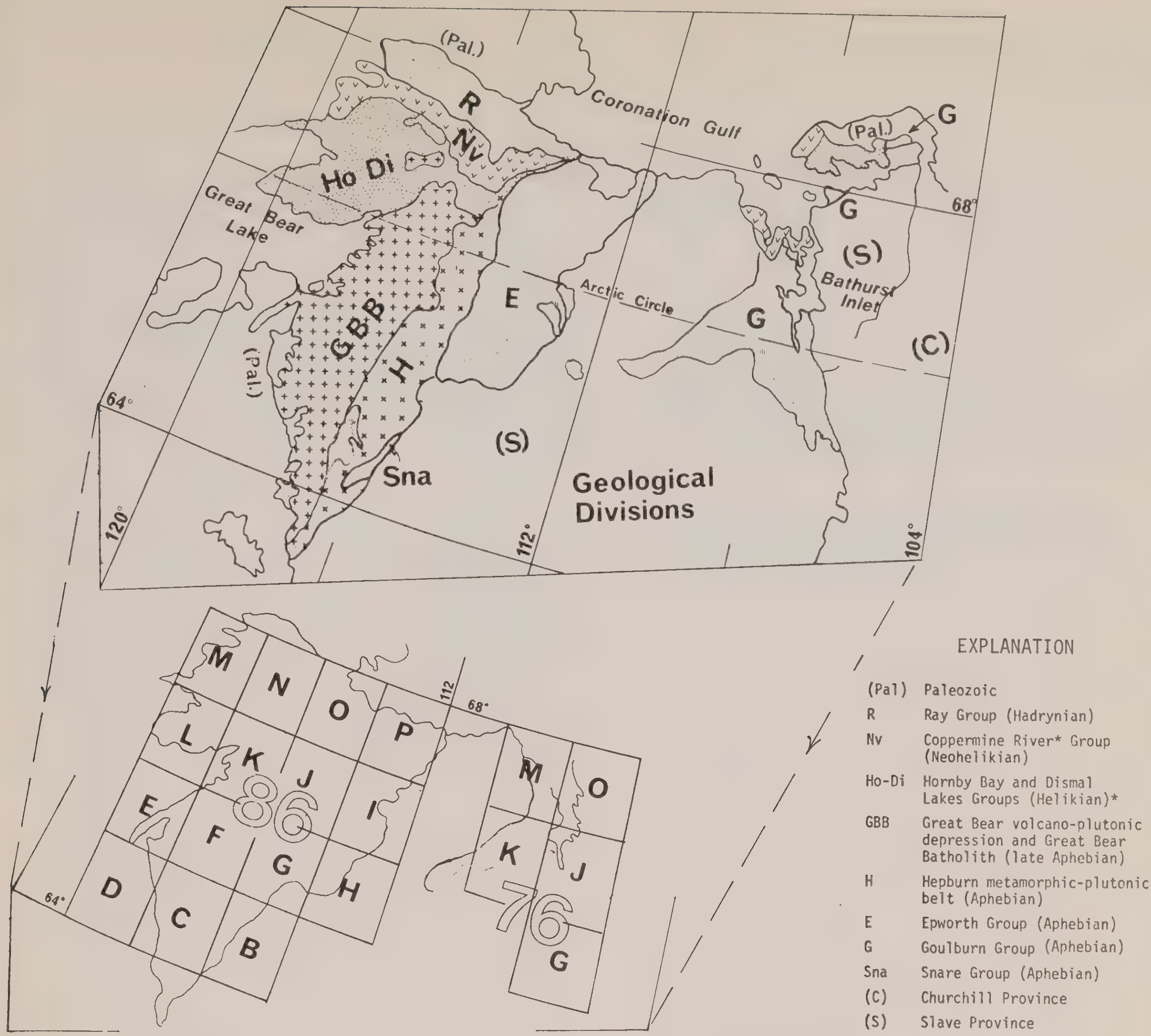


Figure V-1: Geological Divisions of the main part of the Bear Structural Province

origin. After deposition of the Christie Bay Group nappes were emplaced. Following emplacement of the nappes diorite-monzonite laccoliths were intruded.

Conglomerates of the Murky Formation followed by lithic and feldspathic sandstones of the Preble Formation together comprising the Et-then Group succeed the Great Slave Supergroup unconformably. These sediments were deposited contemporaneously with movements of the Macdonald-Wilson Fault.

Hoffman (1973) divides deposition of sediments in the East Arm subprovince into eight phases: Prequartzite, quartzite, dolomite, pre-flysch, flysch, calc-flysch, molasse and fanglomerate. Of these stages the first three and last two are confined to the aulacogen.

Current exploration is mainly for uranium in rocks of the Sosan Group; particularly the Hornby Channel and Kluziai Formations.

A variety of geological settings hosting base metals have been explored intermittently in the East Arm during the last four decades. Examples include: volcanic breccia pipes, probably related to the Seton volcanics as on the BBX Property; galena and chalcopyrite in andesitic volcanics of the Seton Formation on Keith Island; copper in fractured carbonate rocks on the Pethei and Douglas Peninsulas. Copper, the target of 1975 drilling on the COGO group at Lac Duhamel, occurs in veins cutting pre-Sosan Group granitic rocks.

BBX, JDA and GUN CLAIMS | Copper, Cobalt
Great Plains Development Company | 75 L/12
of Canada Limited, | 62°35'N, 111°30'W
715-5th Avenue S.W.,
Calgary, Alberta.

REFERENCES
Gibbins *et al.*, (1977); Hoffman (1968); Hoffman *et al.*, (1977a, b); McGlynn (1971); Stockwell (1936); Stockwell *et al.*, (1968); Stockwell and Kidd (1932).

PROPERTY
BBX 1-40; JDA 1-14; GUN 1, 2.

LOCATION
The claims are 90 miles east of Yellowknife, just west of Thaltheilei Narrows and immediately east of Aristifat's Lake. A gravel airstrip services a fishing lodge immediately north of the property.

HISTORY
The copper-cobalt showing, known since 1931, has been staked, together with the surrounding ground as the BBX and other claim groups (Gibbins *et. al.*, 1977). In late 1974 and early 1975 Great Plains staked the GUN and JDA claims adjacent to the BBX.

DESCRIPTION
The property is underlain by Aphebian sediments, including some tuffaceous beds, of the Sosan and Kahochella Groups. Copper-cobalt mineralization occurs in a breccia pipe, which may have been a feeder vent for the volcanogenic sediments of the Seton Formation. The breccia contains fragments of various lithologies including granitic rock, presumably from the basement underlying the Great Slave Supergroup. Argillic and propylitic alteration is reported from drill core. The breccia generally has a carbonate or quartz carbonate matrix. Black shales and red siltstones were intersected adjacent to the vent. Chalcopyrite is the main ore mineral, erythrite staining is common and garnierite is sparingly developed. Smaltite has been reported from drill core and may be accompanied by cobaltite. Pyrite is abundant and widespread. Total disseminated sulphides may attain 5 to 10 per cent by volume. The mineralization is mainly on the northern part of BBX 2.

CURRENT WORK
A total of 2,859 feet was drilled in seven holes, three of which were on BBX 1 and 2. Hole 75-4 was drilled due south at an inclination of -45°, from a point about 250 feet north of the common northern claim post of BBX 1 and 2. Holes 75-5, 6, 7 were inclined southwesterly from locations 400 to 800 feet northwesterly from that of 75-4, and lie near the mutual boundary of BBX 9 and 10.

Drilling encountered substantial intersections of copper mineralisation, including 60 feet grading 1.5% Cu in hole 75-5.

FLY, MAID and MER CLAIMS | Uranium
Rio Tinto Canadian Exploration | 75 K/11
Limited, | 62°38'N, 109°17'W
Suite 2600,
120 Adelaide Street West
Toronto, Ontario M5H 2W5

REFERENCES
Hoffman (1968); Hoffman *et al.*, (1977)

PROPERTY
FLY 1-34, 36-42, 44-46; MAID 9, 10, 13, 18; MER 9, 12, 23, 24, 31-34

LOCATION
The property lies 7 miles southwest of Reliance, between Meridian Lake and Charlton Bay near the eastern end of Great Slave Lake.

HISTORY
The MER claims were staked in 1970 by G.W. McConnel and transferred to Vestor Explorations Ltd. The MAID claims were staked in 1971 by B. Brugger, and were mapped and surveyed by scintillometer by Vestor Explorations. The FLY claims were staked in 1975. Those MER, MAID and FLY claims listed above were optioned and explored by Rio Tinto.

DESCRIPTION
Rio Tinto Canadian Exploration maps show the claims to be on Archean granite that is unconformably overlain by the Hornby Channel Formation, the basal unit of the Sosan Group. Hornby Channel Formation is shown in fault contact with the uppermost Akaitcho Formation of the Sosan Group to the north of a wedge-shaped exposure of Archean granite basement, which extends eastwards into the claim group from Meridian Lake. The Sosan Group is conformably overlain by the Gibraltar Formation of the Kahochella Group both north and south of the granite. The Kluziai Formation of the Sosan Group is faulted out and the Duhamel Formation of the Sosan Group is absent in this area (Hoffman, 1968).

Mapping presented at 1:50,000 scale (Hoffman 1977b) shows an interpretation different from Rio Tinto's; the Hornby Channel Formation not being recognized on the claims and the Kluziai Formation being shown as overlying the granite except where the latter is in fault contact with the Kahochella and Pethei Groups. The Stark Formation is also shown to outcrop north and south of the granite basement exposure.

Uranium mineralization is largely confined to a unit of buff and locally red and hematitic, massive to poorly bedded sandstone that reaches 200 feet in thickness and overlies a basal unit of thin-bedded, well-sorted sandstone. Hematite and red staining commonly accompanies uranium mineralization. High angle cross-beds are locally developed. The sandstone is bimodal containing quartz pebbles as much as one centimetre in diameter scattered sparsely in a matrix of rounded quartz grains and cemented by silica and minor dolomite.

CURRENT WORK
Two areas with geology considered favourable to uranium mineralization were mapped at one inch to 200 feet and covered by scintillometer and track-etch surveys. These areas lie north and south of the wedge-shaped exposure of granitic basement.

On the northern grid, mineralization is spatially related to an east-striking fault which has a downthrow to the north. Drilling failed to detect mineralization either within the fault or to its north where the downfaulted extension of the bimodal sandstone unit was not intersected. The track etch

survey outlined two radon anomalies to the west of the drilled area. Scintillometer and track etch surveys did not detect anomalies on the southern grid.

A total of 2,466 feet were drilled in five holes.

COGO CLAIMS
Monpre Iron Mines Ltd.
400, 6299 Airport Road,
Mississauga, Ontario.

Copper
75 L/7
62°19' 110°43'

REFERENCES
Barnes (1951); Hoffman (1968); Hoffman *et al.* (1977a and b); McGlynn (1971).

PROPERTY
COGO 1-22

LOCATION
The claims are on the north side of Lac Duhamel, twelve miles south of Snowdrift.

HISTORY
Four claims were staked in 1936 by W. Haywood and were sold to Monpre Mining Company in 1956, at which time 18 more claims were staked. In 1958 Monpre drilled 3,000 feet in 15 holes, and the following year, optioned the property to Consolidated Mining and Smelting Company of Canada Ltd. The option was dropped in 1960, after completion of an EM survey and 2,287 feet of drilling, that tested an EM conductor in the western part of the property on COGO 4 and 8. An 18 foot wide quartz-chalcopyrite zone containing less than 1% copper was outlined. Drilling on COGO 1 and 2 failed to find extensions of the mineralization.

DESCRIPTION
The property covers most of an exposure of quartz-mica-cordierite-feldspar schist intruded by porphyritic and pegmatitic granitic rocks. These rocks are overlain by younger sediments of the Sosan, Kahochella and Pethei Groups. The northern part of the granite and schist body is in contact with sandstone and minor conglomerate of the Hornby Channel Formation and the eastern part is overlain by red shales and siltstones of the Gibralter Formation. The east-northeasterly trending Haywood Fault separates the granite and schist body from the Duhamel and Kluziai Formations to the south.

Chalcopyrite has been discovered at 20 or more places on the property, but only three showings are considered promising: the No. 3 zone on COGO 2 about 200 feet north of the lakeshore; the No. 4 zone, 1,200 feet northeast of No. 3 zone, and the No. 5 zone on COGO 1, 700 feet west of No. 4 zone. Zone No. 3 strikes east-northeast, parallel to and just north of the Haywood Fault. The chalcopyrite occurs in quartz-carbonate and quartz veins. The Monpre Mining Company reported (Northern Miner, August 21, 1958, p. 5) that a 210 foot length of the No. 3 zone contains 1.4% copper across an average width of 24 feet.

CURRENT WORK
Three holes, totalling 1,019 feet, were drilled in the spring of 1975 but no results have been released.

EMR, HECK, HK, JSD, RAT
and SOS CLAIMS
Rio Tinto Canadian Exploration Limited,
Suite 2600,
120, Adelaide Street West,
Toronto, Ontario M5H 1W5

Uranium
75 L/8
62°09'N, 110°22'W

REFERENCES
Hoffman (1968); Hoffman *et al.*, (1977); Padgham, Kennedy *et al.*, (1975).

PROPERTY
EMR; HECK 28-29; HK 1-7; 4 JSD; RAT 1-76; 10 SOS.

LOCATION
The claims are at Toopon Lake, east of the Snowdrift River and south of McLean Bay. The four claims surveyed in 1975 (SOS 28, 31 and RAT 43, 44) cover the northeast corner of Toopon Lake.

HISTORY
The HECK, HK, JSD and SOS claims acquired by Vestor Explorations Ltd. in 1970 cover Sosan Group rocks considered to have uranium potential. The property was mapped by Vestor in 1971 at a scale of one inch to 1,000 feet and radioactive anomalies located by scintillometer were trenched.

Rio Tinto Canadian Exploration Limited optioned the Vestor property, and by additional staking in 1975, increased the property to 100 claims.

DESCRIPTION
The claims are underlain by paralic sandstones of the Sosan Group and the conformably overlying marine shales of the Kahochella Group. Sandstones of the Kluziai and overlying Akaitcho Formations are the main lithologies exposed, but outcrops of the younger McLeod Formation and the oldest Duhamel Formations have been mapped. The trace of the axial plane of the main structure, an easterly-plunging anticline, intersects Toopon Lake. Subsidiary folds on the flanks of the main anticline are probably responsible for local stratigraphic repetitions. Vestor's maps show the dolomite of the Duhamel Formation is overturned in the extreme southwest.

Vestor's 1971 maps show areas southwest of Toopon Lake underlain by volcanics of the Seton Formation but recent mapping (Hoffman *et al.*, 1977), shows that these areas are underlain by Kluziai and Akaicho River Formation. This discrepancy possibly results from the fact that both formations are locally tuffaceous.

Uranium concentrations are present on the property in the middle and lower members of the Kluziai Formation either in oxidized hematitic orthoquartzite or dark orthoquartzite. The latter are the richer.

CURRENT WORK
Track-etch and scintillometer surveys on eight line-miles of grid tested most of four mainly overburden covered claims. The Kluziai and Akaitcho Formations are exposed on the northern part of the grid, and the Kluziai Formation in the southern part. While no anomalies were detected in the scintillometer survey, about one tenth of the track-etch cups gave anomalous readings.

KILOHIGOK BASIN

The Goulburn Group delineates the northeastern part of the once much more extensive intracratonic Kilohigok Basin (Campbell and Cecile, 1976).

Apart from some thin basalt flows in the Brown Sound Formation and some pipe and dyke breccia complexes of late or post Goulburn Group age, the Kilohigok Basin was filled by sedimentary rocks. The formations can be grossly correlated on lithologic grounds with those of the Athapuscow aulacogen and the Epworth Group.

Clastic sedimentation was followed by carbonate and then redbed sediments in all three basins. Platformal carbonates interfinger basinwards with stratigraphically correlative turbidite sequences.

At present uranium is the main exploration target in the Goulburn Group, although chalcocite has been reported from the 3B stromatolitic carbonate member of the Western River Formation (Campbell and Cecile, 1976). The radioactive occurrences and uranium showings, whose distribution is crudely reflected by property maps, might be thought at first glance to show preference for the Brown Sound Formation, but this is illusory. In detail, the occurrences are variable. Controls of distribution and emplacement are probably:

1. Provenence of the host formations Goulburn Group sediments from the Churchill Structural Province, to the east, where radioactive pegmatites are fairly common.
2. Accumulation of a great thickness of such sediments along the Bathurst Trench.
3. Enhanced accessibility to percolating ground water along the Bathurst Trench resulting from fracturing related to the transcurrent Bathurst Fault system.
4. Local reducing conditions which caused deposition of uranium minerals from percolating ground water. Such local reduction is suggested by the mottled red and green mudstones of the Brown Sound Formation.
5. The existence of structural traps (for example, fractured diabase dykes) which locally channeled or blocked the passage of ground water.
6. Possible additional concentration of uranium mineralization at or near unconformities such as those at the base and top of the Aphebian Goulburn Group.

Table V-II

Properties and Projects in the Kilohigok Basin

Name	NTS	Commodity
Bathurst Inlet Project (Cominco Ltd.)	76 G,H, J,N,O	Uranium
Prospecting Permit 358	76 N/6	Base Metals

BATHURST INLET PROJECT — Uranium
Cominco Ltd. — 65°20' to 67°40'N
200 Granville Square, — 105°45' to 108°40'W
Vancouver, B.C.
V6C 2R2

REFERENCES
Campbell and Cecile (1975, 1976)

PROPERTY
The area flown (Fig. V-2) includes the following Cominco Ltd. properties:

POMIE	1-70	76 J/3
TUB	1-29	76 K/9
JCW	1-25	76 K/9

LOCATION
The survey extended south-southeast from the west shore of Bathurst Inlet to southeast of Ellice River (Fig. V-2).

DESCRIPTION
The survey area is part of the Kilohigok Basin that has been incorporated in the Bathurst Trench. Aphebian Goulburn Group sediments, here locally unconformably overlain by the Tinney Cove and Ellice Formations, were derived mainly from the Churchill Province to the east where radioactive pegmatites are abundant.

CURRENT WORK
Figure V-2 shows the area of the radiometric survey which was flown by helicopter at a mean ground clearance of 150 feet.

PROSPECTING PERMIT 358 — Copper, Lead, Zinc
Uranerz Exploration & Mining Ltd. — 76 N/6
Suite 1000, — 67°23'N, 109°15'W
540 - 5th Avenue S.W.,
Calgary, Alberta.

REFERENCES
Fraser (1964); O'Neill (1924); Wright (1957).

PROPERTY
Prospecting Permit 358

LOCATION
The permit area is west of Hood River and Arctic Sound. Bathurst Inlet Lodge is 50 miles to the southeast.

HISTORY
In 1964, Prospecting Permit 43, covering NTS 76 N/6 was held by Roberts Mining Co. The area was mapped that year at a scale of one inch to 5,000 feet. Thirteen rock samples assayed for silver and gold showed no significant mineralization. Anglo-Celtic Exploration Ltd. staked the PIT 1-12 claims in 1968 and the following year mapped them on a scale of one inch to 500 feet. Seven samples, assayed for silver, gold, copper and zinc, gave discouraging results. Prospecting Permit 358 was acquired in April, 1975 by Uranerz.

DESCRIPTION
The property is bisected by the northwest-trending Bathurst Fault. The Aphebian Goulburn Group and Parry Bay Formation, overlain by the basalts and sediments of the Coppermine River Group lie east of the fault and Archean metasediments of the Yellowknife Supergroup and intrusive granites and gneisses lie to the west.

CURRENT WORK AND RESULTS
In 1975, EM and magnetometer surveys, totalling 1,883 line-miles flown along lines 0.25 miles apart, outlined 81 conductors, 62 of which were associated with magnetic anomalies. The permit area was mapped at a scale of 1:63,000 and ground EM and magnetometer surveys were used to define the airborne anomalies. Most of the anomalies investigated correspond to dis-

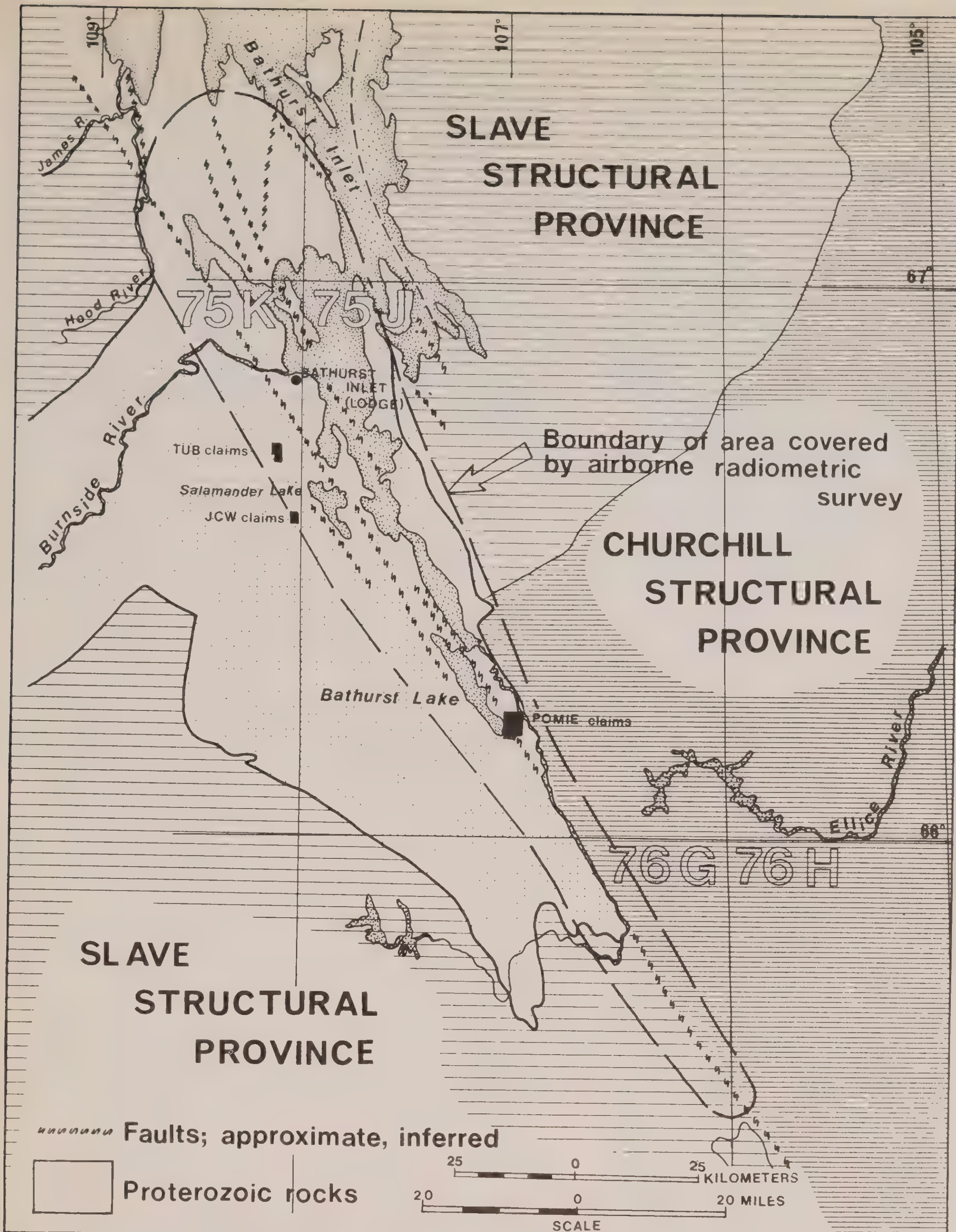


Figure V-2: Bathurst Inlet area and extent of Cominco's Bathurst Inlet Project

seminated to massive pyrrhotite in black slate and to magnetite-rich diabase dykes and sills. Lake sediment sampling revealed some strong anomalies with up to 2,200 ppm zinc. One of these lies just south of a small exposure of mafic volcanics. Yellowknife Supergroup metasediments consisting mostly of mica schists underlie the western two-thirds of the area. Near the Bathurst Fault pyrrhotite and pyrite are abundantly disseminated in black slate which may be part of the Yellowknife Supergroup. Pegmatite dykes, granite and granodiorite intrude the metasediments and migmatites have developed locally at the contacts.

Granodiorite near the fault contains numerous quartz-dolomite veins with sulphide mineralization.

Unconformities separate the three Proterozoic units from each other and from the Archean rocks. The Goulburn Group consists of sandstones with minor argillite and quartzite. The Parry River Formation is largely limestone and dolomite and the Coppermine River Group consists of basalt flows and sediments. The basalt flows often contain native copper and chalcocite. The youngest rocks are the diabase dykes and sills.

Minor amounts of chalcopyrite, chalcocite, bornite, malachite, azurite, erythrite, galena, sphalerite, arsenopyrite, gold and silver occur in quartz veins and shears associated with the Bathurst Fault and its splays.

Forty-five rock samples, taken from the narrow, discontinuous mineralized veins along the fault, were found to contain as much as 25% Cu, 5% Zn, 9% Pb, 2.1 oz/ton Ag and 59 ppm Au. The veins are not more than one metre wide. The stratabound pyrrhotite and pyrite lenses in the slates, as much as 0.2 metres thick contain as much as 0.18% Ni and 0.21% Co.

THE GREAT BEAR BATHOLITH (VOLCANO-PLUTONIC DEPRESSION)

The late Aphebian epizonal Great Bear Batholith is bordered to the east by the Hepburn Batholith, a mesozonal complex of granitic rocks and gneisses, from which it is separated for much of its length by the Wopmay Fault. To the west, the Great Bear Batholith is flanked by Palaeozoic sediments and by the waters of Great Bear Lake. To the north Helikian sediments of the Amundsen Basin overlie, or are in fault contact with volcanic and granitic rocks of the Great Bear Batholith, but locally, as in the vicinity of the Dismal Lakes, exposures of Aphebian rocks of Great Bear Batholith type form hills surrounded by Helikian sediments of the Amundsen Basin. The Aphebian rocks have been subjected to intense paleosoprolitic alteration prior to the deposition of the Helikian sediments (Hoffman and McGlynn, 1976); a fact of significance to uranium exploration.

The northern part of the Great Bear Batholith is a complex composed of a great thickness of intermediate to acidic ignimbrites and lavas intruded by comagmatic plutons. The volcanics and associated mainly volcanogenic sediments include the Echo Bay and Cameron Bay Groups of earlier literature; terms which were superceded (Hoffman and Bell, 1975) and replaced by subdivisions of the Sloan River Volcanics. The old Echo Bay and Cameron Bay Groups were included in the Western Sequence of the Sloan River Volcanics. A more comprehensive informal stratigraphic nomenclature was proposed by Hoffman and McGlynn, 1976.

The Western Sequence, which includes a large andesitic shield volcano in the Port Radium area, hosts the uranium and silver veins of the Eldorado and Echo Bay Mines. The Camsell River Silver District is underlain by a northwesterly plunging syncline of Western Sequence rocks, possibly originally contiguous with, but now separated from the Echo Bay area rocks by a major dextral, northeast striking transcurrent fault. Northeasterly striking dextral strike slip faults and related divergent fractures are loci of uranium and silver deposition in the Echo Bay and Camsell River districts. Similarly striking faults and related giant quartz veins are closely associated with uranium mineralization in the Rayrock Mine area, in the south of the Great Bear Batholith, and in the western margin of the batholith as at Beaverlodge Lake. At Beaverlodge Lake however, the 'Giant quartz vein' may be a massive quartzite. Massive chalcocite accompanied by bismuth occurs adjacent to a northeast striking giant quartz vein on the PATCH claims north of the Sloan River.

Numerous small uranium showings throughout the Great Bear Batholith are fracture controlled and commonly accompanied by hematitic alteration and locally by magnetite. The better showings are pod-like concentrations of high grade pitchblende, or uraninite which may be associated with copper mineralization as near Mazenod Lake, near the southwest margin of the Bear Province.

Uranium is also found in a discontinuous belt of porphyritic rocks which may be in part a southern equivalent of the Sloan River volcanics, preserved as roof pendants in granitic rocks.

Copper mineralization at two locations near the Norex silver deposit has been ascribed characteristics typical of some porphyry copper deposits (Murphy and Shegelski, 1973; Shegelski and Thorpe, 1972), but as yet nowhere in the Bear Province have such deposits been found of a size comparable with those commercially exploited.

TABLE IV -III

PROPERTIES AND PROJECTS IN THE GREAT BEAR BATHOLITH

Name	N.T.S.	Commodity
DM	85 K/16	U
KS	85 N/1	U
HONK	85 N/10	U
DIANNE, SUE	85 N/10,15	U,Cu
UGI, FXO	85 C/7	U
JOE	86 D/9	U
KM	86 D/9	U
A, CATHY, GOSSAN, ICE, LEAH	86 E/9	Ag
Silver Bay Mines Ltd. Northrim Mines Ltd.	86 E/9,F/12	Ag,Bi
ROSE, WOLF, LK	86 F/12	Ag
GR	86 F/16	U
DYDEE	86 K/2	Au,Ag,Bi,Co,Cu
FT	86 K/4	
ADD, CANINE, COMUR, HOOK, SLO	86 K/9	U
PATCH	86 K/11	Cu

D.M. CLAIMS
Saratoga Explorations Ltd.
Box 1176,
Yellowknife, N.W.T.

Uranium
85 K/16
62°56'N, 116°14'W

REFERENCES
Douglas and Norris (1960); Douglas *et al.*, (1974); Lord (1942).

PROPERTY
DM claims 1-6

LOCATION
The claims are south of Bedford Point on the west shore of Marian Lake, 68 miles west-northwest of Yellowknife.

HISTORY
In 1954 Kix Uranium Ltd. found radioactive showings on what is now the DM group. After trenching in 1955 the claims were allowed to lapse. Giant Yellowknife Mines restaked the ground as the MAR claims and scintillometer surveys, geological mapping and sampling were done in 1966. This exploration was concluded by 1,002 feet of diamond drilling in three holes. The best intersections were 0.03% U_3O_8 over 8.5 feet and 0.11% U_3O_8 over 1.0 foot. The ground was restaked in early 1975 by Saratoga Explorations Ltd.

DESCRIPTION

The claims, which are near the southern extremity of the Bear Structural Province, near the Slave Province boundary, are underlain by pegmatites, grandiorites and syenites. A set of steeply dipping northerly-striking faults host several uranium showings associated with quartz stockworks in brecciated grandiorite. A zone of low grade, finely disseminated pitchblende of larger tonnage potential was discovered in 1975 in altered granitic rocks. The showing had not been previously tested.

CURRENT WORK AND RESULTS

In 1975, the claim group was mapped and prospected using scintillometers.

KS CLAIMS — Uranium
Noranda Exploration Company Ltd. — 85 N/1
P.O. Box 1619, — 63°09'N, 116°12'W
Yellowknife, N.W.T.

REFERENCES

Lord (1942); McGlynn (1971)

PROPERTY

KS 1-2

LOCATION

The property is eight miles north of Marion Lake, 80 miles northwest of Yellowknife.

HISTORY

In 1956 L. Syke staked the CX claims and trenched the uranium showing. In 1971 K. Silvester staked the KS claims and from a small pit collected a sample which assayed 0.07% U_3O_8. The claims were transferred to Noranda in 1975.

DESCRIPTION

Granodiorite, granite and allied rocks of Archean or Proterozoic age underlie the claims. Pitchblende and secondary oxidation products are associated with hematized, chloritic, south-striking shear zones and joints in biotite granite. Pitchblende-bearing lenses and pods as much as one foot wide pinch and swell over a strike length of more than 150 feet.

CURRENT WORK AND RESULTS

The claims were mapped at a scale of one inch to 50 feet and readings were taken with a DISA 400A spectrometer every 25 feet along lines spaced 100 feet apart. A radon probe was used to trace the mineralized zones in areas of overburden.

The results of these surveys indicate the showings have little economic potential.

HONK CLAIMS — Uranium
Uranerz Exploration & Mining Ltd. — 85 N/10
Suite 1000, — 63°23'N, 116°31'W
540 - 5th Avenue S.W.,
Calgary, Alberta.

REFERENCES

Lord (1942); Richardson *et al.*, (1973)

PROPERTY

HONK 1-10

LOCATION

The claims are near Betty Lake, 100 miles northwesterly of Yellowknife. A winter road from Rae to Rayrock Mines passes through the property.

HISTORY

The HONK claims were staked in 1974 to cover a radiometric anomaly outlined by an airborne survey. The anomaly, which gives readings of 4 times background, has a uranium to thorium ratio of approximately 4:1. Previously the area had been flown by a government sponsored radiometric survey (Richardson *et al.*, 1973).

DESCRIPTION

The claims are underlain by early Aphebian calcareous argillites of the Snare Group which have been locally altered to pyroxene-bearing skarns by late Aphebian intrusions which range in composition from granite to mafic syenites and diorites. Aplitic pods and stringers are common both in the sediments and igneous rocks.

Pitchblende has been found as disseminations and as fracture fillings in pyroxene diopside skarns at the contact of syenite intrusions with the more calcareous members of the Snare Group.

CURRENT WORK AND RESULTS

The claim group was mapped at a scale of 1:4,000 and ground scintillometer and magnetic surveys were conducted on 31 miles of cut line.

SUE, DIANNE CLAIMS — Uranium, Copper
Noranda Exploration Co. Ltd. — 85 N/10, 15
P.O. Box 1619, — 63°45'N, 116°52'W
Yellowknife, N.W.T.

REFERENCES

Lord (1942); Richardson *et al.*, (1974).

PROPERTY

SUE 1-7; DIANNE 1-11.

LOCATION

The claim group is 120 miles northwest of Yellowknife. The Port Radium-Rae winter road route is near the property.

HISTORY

The SUE-DIANNE claims were staked in 1974 and optioned to Noranda Exploration Company Limited by L. Cooke and D. Smith. The claims cover a radioactive anomaly located by a government sponsored airborne radiometric survey (Richardson *et al.*, 1973).

DESCRIPTION

Rocks underlying the Sue-Dianne Group that had previously been mapped as feldspar porphyry and feldspar-quartz porphyry (Lord 1942) are now thought by Noranda's geologists to be a series of welded ash flows ranging from rhyolite to dacite in composition. It has been suggested that these flows are intruded by granitic rocks at depth. The volcanic rocks are well jointed and sheared and localized breccia zones exhibit strong hydrothermal alteration in the form of hematization, silicification and potassic enrichment of the feldspars. Pitchblende and its secondary oxidation products, occur as narrow veinlets in shears and joints of the alteration zones. Chalcopyrite, malachite and azurite are intimately associated with the uranium minerals. This assemblage of rocks, minerals and alteration products has similarities to a typical porphyry copper system, and it is now thought that the property has more potential for copper than for uranium.

CURRENT WORK AND RESULTS

The claims were mapped at a scale of one inch to 100 feet. Because of equipment problems 30 feet of drilling achieved little, and work was suspended.

FXO, UGI CLAIMS — Uranium
Uranerz Exploration & Mining Ltd. — 86 C/7
110, 7220 Fischer Street S.E., — 64°15'N, 116°44'W
Calgary, Alberta.

REFERENCES
Gibbins *et al.*, (1977); Lord (1951); Thorpe (1972).

PROPERTY
FXO 1-16; UGI 1-17, 19, 20.

LOCATION

The FXO claims cover an island in DeVries Lake and the UGI claims cover part of the southeast shore of the lake. The winter road from the Yellowknife Highway to the Echo Bay Mine lies 20 miles west of the property.

HISTORY

The area was prospected in 1953 following the discovery of uranium in the Marian River area. In 1954 geiger prospecting, trenching and sampling tested three of five radioactive zones at the north end of DeVries Lake. In 1967, following an airborne scintillometer survey, the DV and MO claims were staked. In 1968 the DV claims were transferred to DeVries Mines Ltd. and in 1969 Giant Yellowknife Mines Ltd. optioned the property and did ground magnetic and geiger surveying, trenching and sampling. Twelve radioactive anomalies, ranging from 200 to 500 cps, were outlined.

The DV and MO claims lapsed and were restaked as the UGI and FXO claims in 1974 by Uranerz Exploration and Mining Ltd. after an airborne radiometric survey outlined anomalies in feldspar porphyry.

DESCRIPTION

The area is underlain by undifferentiated Proterozoic and Archean granite, granodiorite and allied rocks. A four mile diameter subcircular area of Proterozoic Snare Group metasediments and gneisses, granitic rocks and younger feldspar porphyries is centred on the north half of DeVries Lake. A major fault trends north three miles east of the lake.

Quartz-biotite leucocratic gneisses, feldspar and quartz-feldspar porphyries and remnants of Snare Group sediments, all cut by gabbro and diabase dykes and sills, underlie the claim groups.

Pitchblende, uraninite and allanite is commonly associated with magnetite and hematite in the groundmass of the feldspar porphyries, along joints and fractures cutting the porphyries, in amphibolite pods and along contacts between the porphyries and gneisses.

CURRENT WORK AND RESULTS

Geological mapping at scale of 1:4,000 and 1:500, ground radiometric and magnetic surveys and grab sampling outlined three small radioactive amphibolite pods containing as much as 0.44% U_3O_8 on the UGI claims and five radioactive zones on the FXO claims. Two of the latter are small amphibolite pods and the others are in massive feldspar porphyry. The best assay obtained from the amphibolite was 4.65% U_3O_8 and the best from the feldspar porphyry was 0.90% U_3O_8. There are radioactive siliceous pods along joints and fractures within the feldspar porphyry which in some places assayed as much as .20% U_3O_8 and small chloritized shear zones within the porphyry, one of which contained 11.8% U_3O_8. All radioactive areas correspond to magnetic highs.

JOE CLAIMS — Uranium
New Pyramid Gold Mines Inc. — 86 D/9
2560, 700 W. Georgia Street, — 64°45'N, 118°10'W
Vancouver, B.C., V7Y 1B6

REFERENCES
Gibbins *et al.* (1977); Henderson (1949); Lord (1951); McGlynn (1971); Thorpe (1972).

PROPERTY
JOE 1-6

LOCATION

The property lies on the north side of the east arm of Beaverlodge Lake, 95 miles south of Port Radium and 200 miles northwest of Yellowknife.

The winter road between Terra Mine and Port Radium is 15 miles west of the property. A 4,000-foot gravel airstrip built at the property in 1956 is not serviceable.

HISTORY

Pitchblende showings were first discovered in the area by Indian trappers in 1933. The TATEE and BEE claims were staked in 1934 by D. Arden and E.H. Hargreaves, and Hottah Lake Mines Ltd. was formed to develop the showings. A 50- to 60-foot shaft was sunk and numerous pits were excavated. Approximately 1.5 tons of handsorted ore grading 40.5% U_3O_8 were produced before the claims were allowed to lapse.

The CORMAC claims were staked in 1943 and acquired by Traverse Longlac Mines Ltd. in 1954 (McGlynn 1971). Sixteen holes totalling 2,005 feet were drilled in 1955. Eight of the holes intersected high grade pitchblende pods below the exhausted surface showings. Assays ranged from 0.1% U_3O_8 over 9 feet to 10.7% U_3O_8 over 10 feet. Traverse Longlac Mines was then absorbed by Consolidated Beta Gamma Mines Ltd. who, in 1956, drove a 750-foot adit and did 1,000 feet of drifting and crosscutting on the mineralized zone.

In 1966 the property, restaked as the TIN and ATOM claims, was optioned by Syracuse Oils Ltd. and Index Construction Co. Ltd.

In 1970 the claims were restaked as the JOE claims for Nemco Explorations Ltd. A ground scintillometer survey in 1974 failed to outline any new zones of radioactivity. New Pyramid Gold Mines Inc. acquired the claims in 1975.

DESCRIPTION

The property is underlain by a northeast-trending belt of Aphebian rocks including massive and fragmental feldspar and quartz-feldspar porphyries, minor dacite flows and quartzite which are cut by gabbro dykes. These rocks are thought to be a faulted roof pendant surrounded by a granitic intrusive. The quartzite is in contact with granite to the northwest

and is separated from quartz porphyry and volcanics to the southeast by a major fault. Pitchblende, hematite, quartz and chlorite form lenses and pods in fractures and breccia zones within the quartzite near the fault contact. Nine uranium showings have been found and three of these were mined.

CURRENT WORK AND RESULTS

Geochemical soil sampling, ground magnetic, and EM surveys investigated two overburden-covered areas. In one area, a moderate uranium anomaly was found at the intersection of a conjugate set of EM conductors. In the other area, one strong uranium anomaly and two moderate anomalies were outlined.

Eleven holes totalling 2,630 feet were drilled into, and near, the two high-grade pitchblende lenses intersected in 1955. No extensions of the two lenses, which contain approximately 200 tons of material grading 3% U_3O_8, were found. Three additional holes, totalling 1,003 feet, did not intersect significant mineralization.

DM CLAIMS — Uranium
Quatsino Copper-Gold Mines Ltd. — 86 D/9
306, 736 Granville Street, — 64°43'N, 118°15'W
Vancouver, B.C., V6Z 1G3

REFERENCES

Henderson (1949); Lord (1951); McGlynn (1971); Thorpe (1972).

PROPERTY

DM 1-15

LOCATION

The claims lie on the west shore of Beaverlodge Lake, 200 miles northwest of Yellowknife.

HISTORY

The DM claims were staked for D.N. Small in 1975. The JOE claims, to the northeast, cover ground previously held as the TATEE, BEE, CORMAC, ATOM and TIN claims, which has been explored intermittently since 1934. Approximately 1.5 tons of handsorted ore grading 40.5% U_3O_8 were produced from showings on the JOE claims in 1934.

DESCRIPTION

The area is underlain by a northeast-trending belt of Aphebian rocks including massive and fragmental feldspar and quartz-feldspar porphyries, minor dacitic flows and quartzite. These rocks are cut by metagabbro and younger diabase dykes and are thought to be a faulted roof pendant in granitic intrusives.

A major fault separates the quartzite from quartz porphyry and volcanics to the southwest. Within the quartzite, near the fault contact, pitchblende, hematite, quartz and chlorite occur as lenses and pods in fractures and breccia zones.

CURRENT WORK AND RESULTS

Ground scintillometer and magnetometer surveys outlines an area of greater than background radioactivity with no magnetic response.

A, CATHY, GOSSAN, ICE, LEAH CLAIMS
Terra Mining & Exploration Ltd. — 86 E/9
Suite 204, 8631-109 Street, — 65°35'N, 118°05'W
Edmonton, Alberta, T6G 1E8

REFERENCES

Gibbins *et al.* (1977); Hoffman *et al.* (1976); Padgham *et al.* (1976); Murphy and Shegelski (1972).

PROPERTY

A 3, 38; CATHY 1-17; GOSSAN 1-9, 11-24; ICE 3-8; LEAH 1-35.

LOCATION

The claim groups cover the shores of the Camsell River east of the Terra Mine.

HISTORY

In 1972 the GOSSAN, ICE and A claims were staked for Norex Resources Ltd. Terra Mining and Exploration Ltd. subsequently acquired a 50% interest in these claims. The LEAH claims were staked between 1973 and 1975 by H.A. Sanche for Terra Mining and Exploration Ltd. The CATHY claims were staked in 1975 for Terra Mining and Exploration Ltd. and Sunshine Mining Co.

DESCRIPTION

The claims are underlain by Aphebian intermediate and basic lavas and air-fall tuffs, intruded by a syenite-syenodiorite complex (Hoffman *et al.*, 1976). Quartz-carbonate veins, containing minor amounts of magnetite, pyrite, chalcopyrite and bornite, cutting andesite, are related to northeast-striking fault zones.

CURRENT WORK AND RESULTS

Geological mapping at scales of 1 inch to 300 feet and 1 inch to 500 feet and magnetic, VLF-EM and scintillometer surveying over two grids totalling 63 line-miles outlined several anomalies and conductors, mainly on the LEAH and GOSSAN claims. Thirty-two stream sediment samples collected along major and minor tributaries of the Camsell River were analysed for copper, lead, zinc, silver, cobalt, nickel and arsenic. Values were generally low and erratic. Two hundred and ten soil samples, collected over three geophysical anomalies and analysed for copper, lead, zinc, silver, cobalt, nickel, arsenic, mercury, bismuth and uranium, indicated the presence of copper, lead and zinc sulphides, arsenides and sulfosalts. One hundred and thirty rock samples were taken from veins and trenches. Very few were anomalous.

In October two holes totalling 643 feet were drilled on claim A3.

SILVER BAY MINE — Ag,Cu,Bi,Co,Ni,Au
Northrim Mines Ltd. — 86 E/9, 86 F/12
Box 6197, Postal Station D, — 65°36'N, 117°58'W
Calgary, Alberta.

REFERENCES

Badham (1972); Badham *et al.*, (1972); Kidd (1932); Lord (1951); Lord and Parsons (1952); Murphy and Shegelski (1972); Padgham, Shegelski *et al.*, (1974); Padgham, Kennedy *et al.*, (1975); Lord and Parsons (1952).

PROPERTY

GLADYS 1, 2; HERBY 1; LARRY 1, 2; LK 1; LM 1-8; MANDY 1-4 and fraction; ROSE 9, 10; TILLY 1-10;

WOLF 3-10.

LOCATION

The property is on the north side of the Camsell River, five miles east of Terra Mine.

The Norex airstrip is one mile to the south, on the opposite side of the river.

HISTORY

The first discovery on the property was made in 1932 (Lord, 1951; Padgham *et al.*, 1975). More recent history is summarized in the following written communication from Northrim Mines Ltd.:

"In 1970, Federated Mining Corporation Ltd. acquired the property from Silver Bay Mines Ltd. and formed Camsell Holdings Ltd., who operated the property until 1972. In 1973, Northrim Mines Ltd. acquired Camsell Holdings Ltd. and has operated the property since that time. During 1970, the underground workings were rehabilitated and some ore mined. During 1971-1972, drilling, underground development, stoping and installation of 100 ton per day underground mill was carried out."

DESCRIPTION

The claims are underlain by a unit of basaltic lavas and pyroclastics (Murphy and Shegelski, 1972) which lie on the south limb and near the axis of a northwest plunging syncline in the western volcanic sequence of the Sloan River Volcanics of Hoffman and Bell (1975). Intrusive, in part synvolcanic, syenite and granite flank the syncline. The claims lie just west of a large granitic intrusion. Three mineral zones have been described (Padgham, Kennedy *et al.*, 1975).

CURRENT WORK

Four holes, from locations on LK 1, and ROSE 9, 10 were drilled at -45° on various azimuths. The holes intersected basalt and some syenite or granite. Vein material was encountered within both basalt and the granitic rock but sample and assay results were not reported.

Four hundred feet of 15% grade decline was driven and about 1,000 tons of material mined.

GR CLAIMS	Uranium
Seaforth Mines Ltd.	86 F/16
202, 11111-87A Ave.,	65°56'N, 116°27'W
Edmonton, Alberta, T6G 0X9	

REFERENCES

Gibbins *et al.*, (1977); Lord and Parsons (1952); McGlynn (1976); Richardson *et al.*, (1973).

PROPERTY

GR 1-15

LOCATION

The property is east of Greenrock Lake and 45 miles east of Echo Bay.

HISTORY

GR 1-12 were staked for Seaforth Mines Ltd. in 1973 to cover an anomaly outlined by an airborne gamma-ray spectrometer survey (Richardson *et al.*, 1973). Subsequent scintillometer prospecting and geological mapping outlined three radio-active areas. GR 13-15 were staked in June, 1975.

DESCRIPTION

The area is underlain by granitic rocks which are intruded by quartz-feldspar porphyry at the east end of Greenrock Lake. A small metavolcanic belt trends northwest in the granites and porphyry northwest of the claim group. Two major faults trend northeasterly and three trend northerly across the claim group. Pitchblende, hematite, chlorite and minor chalcopyrite occur in fractures within the quartz-feldspar porphyry.

CURRENT WORK AND RESULTS

Trenching of the main radioactive showing exposed minor discontinuous uranium concentrations but scintillometer prospecting did not find new radioactive occurrences.

DY-DEE CLAIMS	Gold, Silver, Copper, Bismuth,
R.A. Lees,	Cobalt
4003 Bow Road,	86 K/2
Victoria, B.C.	66°08'N, 116°39'W

C. Molholm,
6705 Pat Bay Highway,
Victoria, B.C.

REFERENCES

Hoffman and Bell (1975); Hoffman *et al.*, (1976); Padgham *et al.*, (1976).

PROPERTY

DY-DEE 1-16

LOCATION

The claims lie on the southeast shore of Uhlman Lake, 35 miles east of Port Radium.

HISTORY

Staked in 1973 by R.A. Lees and C. Molholm, the claims cover mineralized quartz veins.

DESCRIPTION

The property is underlain by red coarse-grained porphyritic granite cut by steeply-dipping, hematitic quartz veins generally 4 to 15 inches wide.

CURRENT WORK AND RESULTS

Cleaver Lake Mines Ltd. engaged I.G. Park to do geological and EM surveys over the claims in 1975. Four veins were examined. Vein No. 13 is 4 to 12 inches wide and contains chalcopyrite and erythrite. A selected sample of material from this vein is reported to have assayed 0.144 oz/ton Au, 0.73 oz/ton Ag, 0.11% Cu, 2.38% Co and 11.5% Bi. Vein No. 10 is as much as three feet wide, 120 feet long but is barren except for minor chalcopyrite and bismuthinite in one location. Vein No. 2 is four to six inches wide and locally contains chalcopyrite. Vein No. 3 is 75 feet long, as much as six feet wide and contains local concentrations of chalcopyrite, malachite, azurite and erythrite.

FT CLAIMS
Echo Bay Mines Ltd.,
Suite 408, 10355 Jasper Avenue,
Edmonton, Alberta, T5J 1Y6

Silver, Copper
86 K/4
66°07'N, 117°54'W

REFERENCES
Hoffman and Bell (1975); Mursky (1973).

PROPERTY
FT 1, 3-8, 10-12, 15, 17-24, 29, 31-35.

LOCATION
The claims cover the east shore of Glacier Lake, 4 miles northeast of Port Radium. There is a gravel airstrip on the west side of Glacier Lake, and barges travelling along the Great Bear Lake Mackenzie River transportation system can reach the claims.

HISTORY
The area has had a long history of staking and prospecting since the discovery of silver in the early 1930's. The FT claims, staked in 1974 for Echo Bay Mines Ltd., cover ground previously staked as the TL, RUST, AM, HR, JON and CAL claims.

DESCRIPTION
Porphyritic andesite flows and minor tuff, agglomerate, quartzite and conglomerate underlie most of the property and are overlain, to the east, by volcanic lithic sandstone, conglomerate and mudstone. These rocks are part of the western sequence of the Aphebian Sloan River volcanics (Hoffman and Bell, 1975) and are intruded on the west side by granitic rocks of the Great Bear Batholith. All rocks are cut by east-trending Helikian diabase dykes.

On the claims there are extensive gossans and quartz veins along faults cutting the porphyrytic andesite.

CURRENT WORK AND RESULTS
The property was mapped at a scale of 1 inch to 200 feet, a 1028-foot hole was drilled, and 1660 soil samples were analysed for silver, copper, nickel and uranium. Several soil anomalies were outlined which generally coincide with gossans. Grab samples from gossans, alteration zones and quartz veins were collected.

ADD, CANINE, COMUR, HOOK,
SLO CLAIMS
Cominco Ltd.,
200 Granville Square,
Vancouver, B.C.
V6C 2R2

Uranium
86 K/9
66°37'N, 116°05'W

REFERENCES
Hoffman and Bell (1975); Hoffman *et al.*, (1976).

PROPERTY
ADD 1-3, CANINE 5, 6, 9, 13, 35-37, 44-46, 52, 54, 59-61; COMUR 1-20; HOOK 58, 68, 69, 74-82; SLO 76, 77, 90-95, 109-112, 127-130, 146, 147.

LOCATION
The claim groups lie in the St. Germain-Perrault Lakes area, 65 miles northeast of Port Radium.

HISTORY
The claims were staked in 1974 and 1975 for Cominco Ltd.

In 1974, 160 line-miles of scintillometer survey were flown in the area. Geological mapping on a scale of one inch to one mile, prospecting and surface sampling investigated a showing on the COMUR claims.

DESCRIPTION
The country rocks are Helikian Hornby Bay sandstone and Aphebian acidic ignimbrites, basic and acidic lavas, mudstone, sandstone and conglomerate intruded by a feldspar megaporphyry and younger granitic rocks (Hoffman *et al.*, 1976).

There are three uranium showings on the property. The Comur showing is a north-striking, 2,200-foot long and 500- to 600-foot wide zone of brecciated and veined argillite. The Bonana Lake showing, on the CANINE claims, is a zone of fractures in a porphyry intrusion. At the H.P. Lake showing on CANINE 5 and 6, uranium, near the contact between slaty argillite and massive rhyolite tuff, attains its highest concentration in a discontinuous three-inch wide carbonate vein in the rhyolite tuff five feet from the contact with the argillite.

CURRENT WORK AND RESULTS
The Comur showing was mapped at 1 inch to 100 feet, radiometrically surveyed and tested by five drill holes, totalling 2,541 feet. These did not intersect significant uranium concentrations.

The Bonana Lake showing was geologically and radiometrically mapped at a scale of 1 inch to 400 feet. A small trench was excavated and sampled but significant uranium concentrations were not found.

The H.P. Lake showing was mapped at a scale of 1 inch to 50 feet and radiometrically surveyed. Two small trenches were excavated and sampled. One sample contained 20 lb/ton U_3O_8 but the mineralization is of limited extent.

PATCH CLAIMS
Cleaver Lake Mines Ltd.
Suite 260, 727 Johnson Street,
Victoria, B.C., V8W 1M9

Copper, Bismuth
86 K/11
66°31'N, 117°22'W

REFERENCES
Craig *et al.*, (1960); Hoffman and Bell (1975); Hoffman *et al.*, (1976); McGlynn (1971).

PROPERTY
PATCH 1-7, 9, 10, 20-26

LOCATION
The property lies north of Sloan River, approximately 35 miles northeast of Port Radium.

HISTORY
The Patch property was first staked in 1931 by Cominco Ltd. following the discovery of copper-bismuth mineralization in the area. Prospecting and trenching tested the Main, North and South showings. Pan American Ventures Ltd. restaked, prospected and mapped the claims in 1955.

In 1966 part of the property was staked for International Mines Services Ltd. A ground EM survey failed to outline anomalies.

In 1971 North Star Mines Ltd. acquired the present PATCH claims from the staker, S. Otto, cleaned

out and enlarged old trenches and staked additional claims. The property was optioned by Cleaver Lake Mines Ltd. in 1974.

DESCRIPTION

The property is underlain by a granitic pluton of the Great Bear Batholith. The granite is cut by a northeast striking giant quartz vein, as much as 1,000 feet thick.

Three copper-bismuth showings have been found within a quartz stockwork flanking this giant vein. The copper is disseminated and scattered as blebs of massive chalcocite, covellite, minor bornite and chalcopyrite with native bismuth.

CURRENT WORK AND RESULTS

Trenching and nine diamond drill holes, totalling 1,450 feet, outlined significant concentrations of copper and bismuth, as much as 25 feet wide over a strike length of 325 feet on the Main showing. Metal content ranged from 2.77 to 7.33% Cu, nil to 1.70% Bi, nil to 0.02 oz/ton Au, and nil to 0.57 oz/ton Ag over widths of 4.5 to 25 feet.

Samples taken from the North and South showings assayed 1.88% Cu over 9.5 feet and 8.68% Cu over 2 feet.

Ground EM surveys outlined a number of weak conductors in the vicinity of the Main showing. One of these coincides with the mineralized zone.

AMUNDSEN BASIN

Table V-IV

Properties and Projects in the Amundsen Basin in 1975

Name	NTS	Commodity
Prospecting Permit 316	86 N/6	U
PEC	86 N/7	U
BRUCE, JEFF, MIKE, TIM, ROD	86 N/7	U
YUK	86 N/7	U

The Amundsen Basin is filled with Helikian sediments. The Paleohelikian Hornby Bay group, though generally dipping gently northwards, shows much local variation in dip direction. The overlying Neohelikian sediments and volcanics are exposed as a northerly dipping homocline. The volcanics termed the Copper Creek Formation are underlain and overlain by sedimentary formations. The Copper Creek Formation which is composed almost entirely of subareal basalt flows (Baragar and Donaldson, 1973) was intensively explored in the late 1960's for fracture controlled copper mineralization (Thorpe, 1970; Kindle, 1972). The target now is uranium in the underlying Dismal Lakes and Hornby Bay Groups. These Groups contain two units of sandstone and minor conglomerate which are separated by dolomite, sandstone, siltstone and shale (Baragar and Donaldson, 1973). The Dismal Lakes Group comprises a basal unit of sandstone and intercalated black shale succeeded by red mudstone and dolomite.

Interest in the Hornby Bay Group stems from the discovery in 1969 of uranium and the staking of the PEC group, south of Dismal Lakes by the Aquitaine Company of Canada Ltd. Later, Imperial Oil Limited staked trains of radioactive erratics. Aphebian granitic rocks immediately underlying the basal unconformity of the Hornby Bay Group have been deeply weathered.

PROSPECTING PERMIT 316 — Uranium
Imperial Oil Limited — 86 N/6
111 St. Clair Avenue W, — 67°21'N, 117°15'W
Toronto, Ontario, M5W 1K3

REFERENCES

Baragar and Donaldson (1973); Gibbins *et al.*, (1977).

PROPERTY

Prospecting Permit 316

LOCATION

The permit area is north of Mountain Lake and south of Dismal Lakes.

HISTORY

Aquitaine Company of Canada Ltd. flew a radiometric survey over the area in 1968 and the PEC claims were staked in 1969 to cover a uranium showing discovered during ground follow-up. Imperial Oil Ltd. discovered radioactive boulders to the north of Aquitaine's property in 1972 and staked the YUK claims.

In 1974 Imperial Oil Ltd. acquired Prospecting Permit 316 to cover an area west of the YUK and PEC claims. An airborne spectrometer survey outlined 110 anomalies in the permit area, 70 of which were explored by ground radiometric surveying, geological mapping and 336 feet of diamond drilling. Four small radioactive zones were discovered.

DESCRIPTION

The permit area covers part of the Coppermine Homocline and is underlain by Helikian clastics and carbonates of the Dismal Lakes and Hornby Bay Groups, overlying Aphebian granitic and volcanic rocks. Uranium occurs in quartzose sandstone and conglomerate erratics from units 8 and 11 of Baragar and Donaldson (1973).

CURRENT WORK AND RESULTS

Seven of the airborne anomalies outlined in 1974 were examined using a scintillometer. No anomalous radioactivity was detected. Five of the anomalies are coincident with granite, porphyry or Hornby Bay siltstone and shale fragments. The cause of the two anomalies was not determined.

Three of the four radioactive zones discovered in 1974 were re-examined. They are considered uneconomic.

PEC CLAIMS — Uranium
Aquitaine Company of Canada Ltd. — 86 N/7
200 Aquitaine Tower, — 67°16'N, 116°55'W
540 5 Avenue, S.W.,
Calgary, Alberta.

REFERENCES

Baragar and Donaldson (1973)

PROPERTY

PEC 1-12, 14-24, 26, 28, 32-54, 60-64, 69-73, 76-78, 100-102.

LOCATION

The property lies east of Mountain Lake and south of Dismal Lakes, about 65 miles southwest of Coppermine.

HISTORY

A radiometric survey was flown over the area in 1968 by Aquitaine Company of Canada Ltd. The PEC claims were staked in 1969 over a uranium showing discovered during ground follow-up surveys. This was followed by geological mapping, detailed airborne radiometric surveying, prospecting and claim staking in 1970.

DESCRIPTION

The claims lie within the Coppermine Homocline and are underlain by complexly folded and faulted Helikian sediments of the Dismal Lakes and Hornby Bay Groups which unconformably overlie Aphebian granite and gneiss.

Uranium occurs in quartzose sandstone and conglomerate (units 8 and 11, Baragar and Donaldson 1973).

CURRENT WORK AND RESULTS

In 1975 geological mapping, 681 meters of diamond drilling in 10 holes, ground radiometric and VLF-EM surveying, lake water sampling and radon soil surveying outlined two uranium showings. One is in quartzose sandstone and one in conglomerate of the Dismal Lakes Group within 40 meters of the unconformity with the underlying Hornby Bay Group (unit 8, Baragar and Donaldson, 1973) but uranium minerals were not found. The best assay obtained from the drill core was 0.054% U_3O_8 over 0.3 meters.

BRUCE, JEFF, MIKE, ROD, TIM	Uranium
B.P. Minerals Ltd.,	86 N/7
Suite 405, 1199 Pender Street,	67°17'N, 116°55'W
Vancouver, B.C., V6E 2R1	

REFERENCES

Baragar and Donaldson (1973); Gibbins *et al.*, (1977).

PROPERTY

BRUCE 1-28; JEFF 1-34; MIKE 1-29; ROD 1-3; TIM 1-15.

LOCATION

The claims lie northeast of Mountain Lake and south of Dismal Lakes.

HISTORY

Uranium showings were found in the area by Aquitaine Company of Canada Ltd. in 1968 and by Imperial Oil Ltd. who found radioactive erratics north of Aquitaine's PEC group in 1972. In 1974 B.P. Minerals Ltd. discovered a showing north of Imperial Oil's YUK property, staked the JEFF, BRUCE, MIKE, TIM and ROD claims and did geological, geochemical and ground radiometric surveys.

DESCRIPTION

The claims are underlain by Helikian quartzose sandstone and minor conglomerate (unit 8 and 11 of Baragar and Donaldson, 1973). Uranium is concentrated along faults, fractures and bedding planes within the quartzose sandstone.

CURRENT WORK AND RESULTS

Geological mapping at a scale of 1 inch to 600 feet and detailed soil sampling over anomalous areas outlined in 1974 delineated one additional uranium showing.

YUK CLAIMS	Uranium
Imperial Oil Ltd.	86 N/7
111 St. Clair Avenue W,	67°18'N, 116°58'W
Toronto, Ontario, M5W 1K3	

REFERENCES

Baragar and Donaldson (1973); Gibbins *et al.*, (1977).

PROPERTY

YUK 1-95

LOCATION

The claims lie northeast of Mountain Lake and south of Dismal Lakes.

HISTORY

In 1972 radioactive boulders were discovered north of Aquitaine's PEC claims and in 1973 the YUK claims were staked for Imperial Oil Ltd. Exploration in 1973 and 1974 consisted of geological mapping at a scale of 1 inch to 800 feet, grid surveys, radiometric and geochemical surveys, soil gas measurement, airborne spectrometer surveys, diamond drilling of 18 holes totalling 2,298 feet, and the staking of claims YUK 67-79. Roughly 2,000 radioactive boulders were discovered.

DESCRIPTION

The claims lie within the Coppermine Homocline and are underlain by Helikian quartzose sandstone and conglomerate, dolomite, siltstone and shale of units 8, 9, 10 and 11 respectively of Baragar and Donaldson (1973). Quartzose sandstone boulders contain secondary uranium minerals and pitchblende.

CURRENT WORK AND RESULTS

In 1975 ground radiometric, EM, magnetic and refraction seismic surveys, radon soil surveys and diamond drilling of 10 holes totalling 1,392 feet were done and the YUK 80-95 claims were staked. One drill hole intersected quartzose sandstone but no radioactivity greater than background was detected. The source of the radioactive boulders was not found.

THE SLAVE STRUCTURAL PROVINCE

Somewhat less than two-thirds of the Slave Structural Province is made up of Archean sediments and volcanics or their metamorphosed or granitized equivalents (McGlynn and Henderson, 1970). The supracrustal rocks, mainly of the Archean Yellowknife Supergroup, of which about 15% are volcanics, are exposed in sinuous and anastomosing belts, which are locally wrapped around basement gneisses and commonly flanked, separated, or interrupted by bodies of intrusive quartz-diorite, quartz-monzonite and granite. The supracrustal belts though of locally varying strike, have a general northerly elongation. Relatively narrow volcanic belts containing various proportions of mafic, intermediate and felsic components are commonly flanked on one, or more rarely, both sides by metasediments. The metasediments are predominantly greywacke, which is commonly interbedded with thinner layers of pelitic composition that tend to have a phyllitic or slaty cleavage. A

topographically recessive graphitic phyllite may overly the volcanics or may be found locally within the volcanic sequence.

The granitoid plutons show various intrusive contact relationships with the surrounding supracrustal rocks, ranging from concordant with the strike of the surrounding metasediments to markedly crosscutting. The plutons are locally bordered by migmatitic zones, and metamorphic aureoles may be wide or practically absent. Many of the larger plutons are multilobed in outline. Massive posttectonic gran - diorites and quartz-monzonites with associated pegmatite, and strongly crosscutting relationships to the wall rocks have been mapped but they appear to be of small volume.

Mineral discoveries have been mainly in volcanic rocks and consequently these rocks have received most of the exploration effort. Much work remains to be done to determine the relations between the supracrustal rocks and the granites.

Extent of pre-Yellowknife Supergroup basement is still largely a matter for speculation and will remain so until more geochronological studies and detailed mapping have been done. Locally plutonic gneisses, commonly of tonalitic composition unconformably underly supracrustal rocks of the Yellowknife Supergroup as at Point Lake (Baragar and McGlynn, 1976; Henderson, 1975; Henderson and Easton, 1977). Commonly the basal contact of the Yellowknife Supergroup has been obliterated by granitic intrusion. Broad zones of granitic gneiss and migmatite and mixed gneisses including or derived from Yellowknife Supergroup rocks (unit An of McGlynn, 1977) may include areas of basement so far unrecognized. Some of the tonalitic clasts in Yellowknife Supergroup sediments may be derived from unroofed syntectonic plutons.

A number of volcanogenic silver-base metal sulphide deposits have been found near exposures of possible pre-Yellowknife Supergroup basement. Since one or more early periods of vulcanism resulted in accummulation of volcanics round the edge of basins filled largely with turbidites, this is not surprising. The basins were presumably flanked by pre-Yellowknife Supergroup basement. Some of the sediments may be time equivalents of and interfinger laterally with the periferal volcanics. Iron formations within the sediments may be distal products of vulcanism. That the volcanics were not continuous across the basins is suggested by the fact that over a wide area centred on Pellatt Lake and extending from approximately latitude 64° to 66° north and from longitude 108° to 113° west intrusive granitic rocks are in contact with metasediments only. If metavolcanics were originally present, one would expect that they would be, at least locally, preserved over this wide area between exposures of metasediments and granitic intrusions or as inliers in the metasedimentary roofs to the plutons.

The last decade has witnessed a progressive widening of target areas for volcanogenic sulphide deposit exploration, within the Slave Province. Early reconnaissance outlined most of the volcanic belts. Later surveys recognised volcanics in a few areas which had been previously mapped as sediments. Exploration spread to nearly all the greenstone belts including areas newly recognized as underlain by volcanics. At present exploration is being extended into high grade metamorphic and migmatitic terrain.

Most, if not all, of the metavolcanics in the Slave Province have been covered by airborne EM and magnetometer surveys; in some cases by more than one. Many miles of formational conductors have been delineated. Possibly the need to screen these anomalies will result in greater detail in future geological surveys.

Exploration projects are described in the order given in Figure V-3. Most properties were explored for massive sulphides, some for gold and a few in the Yellowknife and Hearne Lake Map Areas for lithium.

Selected references relating to specific parts of the Slave Province or to individual properties are listed in the appropriate subsections. Some general references on the Slave Province and some which, by their nature, do not lend themselves to inclusion in regional subsections (for example, regional geochemical or airborne radiometric surveys by the Geological Survey of Canada) include:
Allan and Cameron (1973); Allan, Cameron and Durham (1973a, b, c); Baragar (1966); Baragar and McGlynn (1976); Darnley (1971); Darnley and Grasty (1972); Henderson (1970, 1975a, 1975b); Lord (1941, 1942, 1951); McGlynn (1977); McGlynn and Henderson (1972); Henderson and Easton (1977); Richardson and Charbonneau (1973).

Some additional general references are given under each subheading to avoid repetition in successive property reports.

Massive Sulphide Exploration

Exploration was concentrated in the northern and eastern parts of the Slave Province where extensive staking and ground studies followed airborne geophysics. Exploration expenditure was much increased relative to 1974.

EASTERN SLAVE PROVINCE

Twenty projects were reported in the Eastern Slave Province; 11 covered ground underlain by or periferal to the Back River Volcanic Complex and six covered ground along or adjacent to the Hackett River Volcanic Belt. About 90% of the exploration in the Eastern Slave Province in 1975 was done in these two areas.

Geological Survey of Canada reports, written on these areas prior to 1973, include those by:
Barnes and Lord (1952); Brown (1950a, b); Folinsbee (1949, 1952); Fraser (1964); Tremblay (1971); Wright (1967).

Selected post-1973 reports are referred to in individual project or property reports.

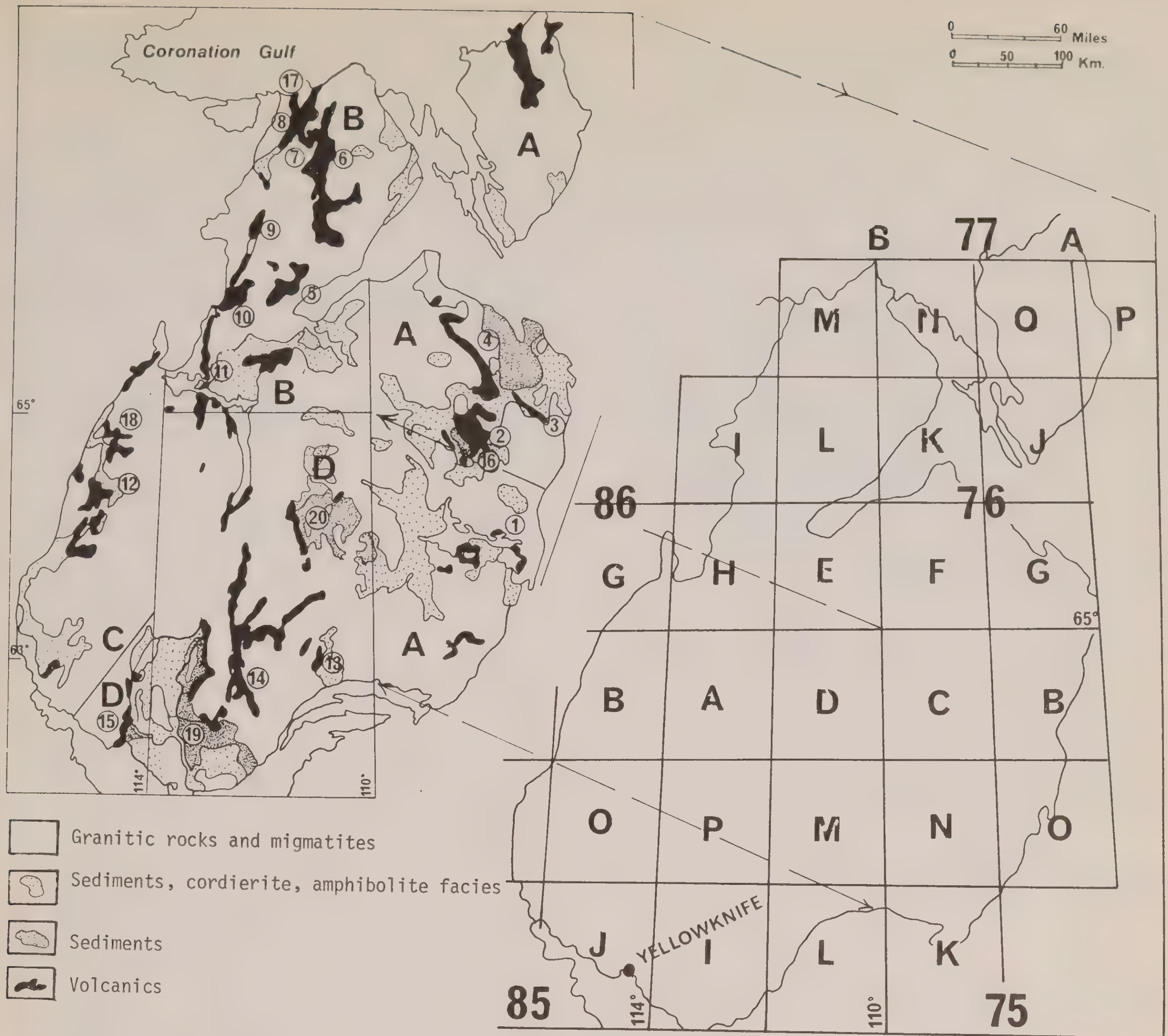


Figure V-3. Location map and grouping system for Slave Province properties.

Massive Sulphide Exploration

A Eastern Slave Province

1. Clinton Colden Lake Volcanic Belt
2. Back River Volcanic Complex (Fig.V-4)
3. Casey Lake Volcanic Belt
4. Hackett River Belt-Beechey Lake Belt (Fig.V-5,V-6,V-7)

B Northern Slave Province (Fig.V-8, V-9,V-1-,V-11)

5. 76L Southwest Segment (Fig.V-8)
6. High Lake Belt (Fig.V-8,V-9)
7. Run Lake Belt, southeast branch (Fig. V-8,V-9)
8. Run Lake Belt, main section (Fig.V-8,V-9)
9. Hawk Lake-Blue Lake Belt (Fig.V-8,V-10)
10. Takiyuak South Segment (Fig.V-8)
11. Point Lake-Itchen Lake Belt (Fig.V-11)

C Western Slave Province

12. Indin Lake Supracrustal Belt

D Southern Slave Province

13. Indian Mountain Lake Volcanic Belt
14. Beaulieu River Volcanic Belt
15. Yellowknife Volcanic Belt

Gold Exploration

A Eastern Slave Province

16. Back River Area (Fig.V-4)

B,C Northern and Western Slave Province

17. Greys Bay Area
18. Indin Lake Supracrustal Belt

D Southern Slave Province

19. NTS 85I and 85J (Hearne Lake and Yellowknife map areas)
20. Courageous Lake Volcanic Belt

Lithium Exploration

D Southern Slave Province

19. NTS 85I and 85J (Hearne Lake and Yellowknife map areas, Fig.V-12).

Properties and exploration projects in the Slave Structural Province are grouped and discussed in the above order.

CC and NOR CLAIMS — Zinc
Kennco Explorations Canada Ltd., — 76 B/4
Suite 730, — 64°06'N, 107°40'W
505 Burrard Street,
Vancouver, B.C.

REFERENCES
Gibbins *et al.*, (1977)

PROPERTY
CC 1-200; NOR 59-66, 71-80 and 83-86

LOCATION
The claims cover part of the north shore of Clinton Colden Lake.

HISTORY
The claims were staked for a prospecting syndicate early in 1973 to cover the possible source of massive sphalerite float discovered the previous year by John Larkin. The property was transferred to Windflower Mining Ltd. and later optioned to Noranda Exploration Company, Limited. After exploring the claims in 1974, (Gibbins *et al.*, 1977), Noranda dropped their option and Kennco Explorations Canada Ltd. acquired exploration rights.

DESCRIPTION
The area is underlain by intermediate to felsic volcanics and sediments of the Yellowknife Supergroup.

Rusty-weathering, sphalerite-bearing float is scattered along a zone inferred to be the northwesterly-trending contact between intermediate and felsic volcanics. There are two gossans in or at the margins of the areas underlain by felsic volcanics. The more westerly of the two gossans covers pyrrhotite and pyrite mineralization.

CURRENT WORK AND RESULTS
Geological mapping at 1 inch to 500 feet was followed by a magnetometer survey.

ROY CLAIMS — 76 B/13, C/16
Cominco Ltd. — 64°56'N, 108°00'W
200 Granville Square,
Vancouver, B.C. V6C 2R2

REFERENCES
Lambert (1976, 1977, 1978)

PROPERTY
ROY 1-20

LOCATION
The claims are 10 miles east of the junction of the Tarpon and Contwoyto Rivers, 265 miles northeasterly of Yellowknife.

HISTORY
ROY 1-20 were staked in 1974 while several companies were exploring the Back River volcanic complex. Cominco had done reconnaissance mapping and possibly some airborne geophysics over the area in 1969.

DESCRIPTION
The claims, in the central part of the Back River volcanic complex, are underlain by felsic to intermediate volcanics and gabbroic intrusives. The volcanics exhibit upper greenschist facies metamorphism. There is a bed of shale and greywacke about 400 feet in width and thin layers of pyritic chert in the felsic volcanics in the northern part of the claims. Small plugs of quartz-porphyry and quartz-feldspar porphyry intrude the northeast-striking and steeply northwest-dipping volcanics in the south-central part of the claim group.

The volcanics contain minor amounts of chalcopyrite and sphalerite.

CURRENT WORK
The claims were mapped at a scale of one inch to 400 feet and 16 rock samples were assayed for zinc, lead, copper and silver.

VWJ CLAIMS — 76 B/12, 13
Great Plains Development Company — 76 C/9, 16
of Canada Ltd., — 64°47'N, 108°00'W
715-th Avenue S.W.,
Calgary, Alberta, T2P 2X7

REFERENCES
Lambert (1976, 1977, 1978)

PROPERTY
VWJ 1-68

LOCATION
The claims are north of the Back River, 260 miles northeast of Yellowknife.

HISTORY
VWJ 1-68 were staked in 1975 and are owned equally by Great Plains Development Company of Canada Ltd. and Rio Tinto Canadian Explorations Ltd.

DESCRIPTION
The claims are underlain by felsic, intermediate and mafic volcanics minor mafic intrusions and a larger intrusive body composed of granite and granodiorite. The volcanics include flows, agglomerate, tuff, calcareous tuff and carbonate cemented breccia. They are gently folded about an axis which trends to the northwest in the southern part of the claim block and northerly, in the northern part. The rocks display green schist facies metamorphism. Widespread sericitic and chloritic alteration has mainly affected the felsic volcanics. Disseminated pyrite occurs in 25% of the felsic volcanics and less commonly in the intermediate volcanics. Gossans have formed on felsic volcanics in the east part of the claims.

CURRENT WORK
The VWJ claims were staked following reconnaissance mapping and prospecting of the southern end of the Regan Lake metavolcanic belt. The claims were then mapped at one inch to 1,000 feet and soil and rock samples taken of the gossans and surrounding rocks in the southeast part of the claim block were analysed for copper, lead and zinc.

DOC AND MAG CLAIMS | 76 B/13
Noranda Exploration Company Ltd., | 64°47'N, 107°50'W
P.O. Box 1619,
Yellowknife, N.W.T.

REFERENCES
Lambert (1976, 1977, 1978)

PROPERTY
MAG 1-8; DOC 1-6

LOCATION
The claims are two to three miles west of the Back River, roughly 270 miles northeasterly of Yellowknife. The DOC claims are approximately 0.25 miles north of the MAG claims.

HISTORY
The MAG and DOC claims were staked in 1974 to cover gossans in the Back River volcanic complex.

DESCRIPTION
The MAG group covers two gossan zones; one, in the south part of the group, has formed on carbonate-cemented felsic volcanic breccia; the second, to the north, has formed on graphitic slates. Pyrite is disseminated through the breccia fragments, the slate contains disseminated pyrite and pyrrhotite. Both felsic and mafic volcanics underlie the MAG claims.

On the DOC group pyritic gossans have formed locally on felsic tuffs and graphitic slates.

CURRENT WORK
Several rusty areas were tested by soil and lake sediment sampling. Samples were analysed for copper, lead, zinc and silver. The gossans were mapped at one inch to 100 feet and found to contain only pyrite and pyrrhotite.

SR CLAIMS | Silver, Zinc, Lead
Dupont of Canada Exploration Ltd., | 76 B/13
1550 Alberni Street, | 64°55'N, 107°45'W
Vancouver, B.C.

REFERENCES
Allan *et al.*, (1973); Allan, Cameron *et al.*, (1973); Lambert (1976, 1977, 1978).

PROPERTY
SR 1-31

LOCATION AND ACCESS
The claim group is three miles west of the Back River, roughly 270 miles east-northeast of Yellowknife.

HISTORY
SR 1-31 were staked in September, 1974 for DuPont of Canada Exploration Ltd. to cover sphalerite and galena showing in felsic volcanics discovered during reconnaissance traverses by DuPont of Canada Exploration Ltd. geologists in July, 1974. SR 1-8, 19 and 22-31 lapsed in September, 1975.

DESCRIPTION
Felsic volcanic flows and tuffs underlying the claims strike 100° to 110° and dip nearly vertically. Intermediate feldspar porphyry flows outcrop east of the felsic volcanics in the southwest corner of SR 9.

Lenses of disseminated pyrite in the felsic flows, contain minor concentrations of base metals and are locally silver-bearing.

CURRENT WORK AND RESULTS
Geological mapping at one inch to one quarter mile scale was completed over 12 claims in 1974 and the sulphides were sampled. A 30-foot chip sample across the pyrite lense assayed 30.3 ounce per ton Ag and 0.48% Zn.

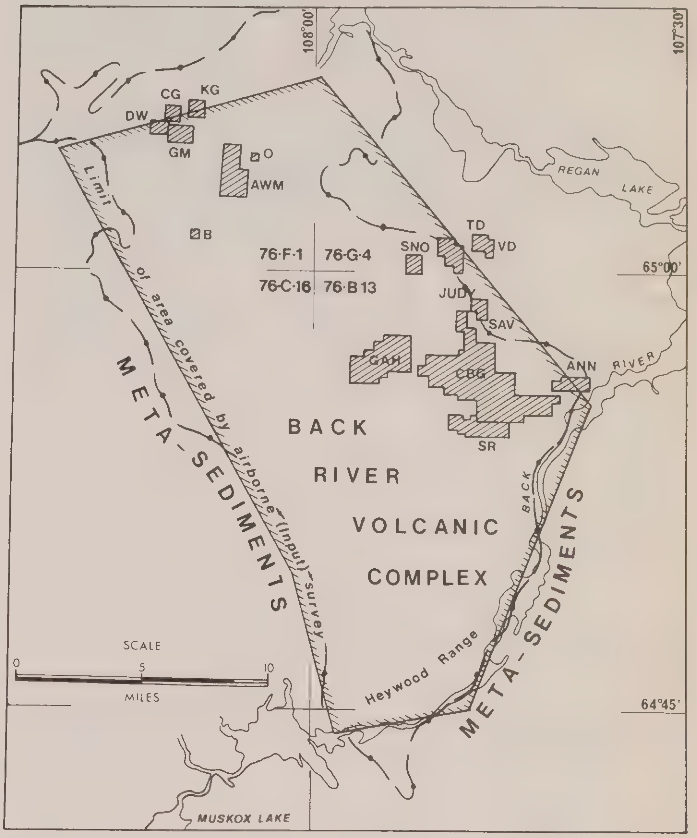


Figure V-4: Back River Project and related staking by Dupont of Canada Ltd.

LRG CLAIMS | 76 B/12
Great Plains Development Company | 64°43'N, 107°57'W
of Canada Limited,
715-5th Avenue S.W.,
Calgary, Alberta, T2P 2X7

REFERENCES
Lambert (1976, 1977, 1978)

PROPERTY
LRG 1-56

LOCATION
The claims which extend three miles south of Back River, are southwest of Heywood Range, 255 miles northeasterly of Yellowknife.

HISTORY
The claims were staked for Great Plains Development Company of Canada Ltd., a subsidiary of Norcen Energy Resources Ltd., in June, 1975, and are 50% owned by Rio Tinto Canadian Explorations Ltd.

DESCRIPTION

The property covers a southward-plunging anticline of intermediate and felsic volcanic breccias and tuffs at the south end of the Back River volcanic complex. Metasediments overlie the volcanics along the southwestern and part of the eastern margins of the claim block. Granitic rocks intrude the felsic volcanics and metasediments near the northern and eastern boundaries of the claims.

Gossans have formed along the contact between volcanics and sediments and locally, on the intermediate volcanics.

CURRENT WORK AND RESULTS

The volcanic belt was mapped at one inch to one half mile and the claims at one inch to 1,000 feet. Trenching and rock and soil sampling tested a 4,250-foot length of the volcanic sediment contact in the southeast part of the claim block.

LAST CLAIMS — 76 B/13
Noranda Exploration Company Ltd., — 64°57'N, 107°52'W
P.O. Box 1619,
Yellowknife, N.W.T.

REFERENCE

Lambert (1976, 1977, 1978)

PROPERTY

LAST 1-6

LOCATION

The claims cover part of the south shore of an east-flowing river 12 miles north of Heywood Range and 270 miles northeast of Yellowknife.

HISTORY

The claims were staked in 1974 to cover gossans at a time when several companies were reconnoitering the Back River volcanic complex.

DESCRIPTION

Nearly vertical-dipping interbedded volcanics and sediments strike northwest across the claims which lie near the northeast margin of the Back River volcanic complex. The sediments include green and black slates, greywackes and minor amounts of laminated chert. Gossans are mainly derived from outcrops of pyrite-rich slate but a small gossan covers pyrite and pyrrhotite bearing felsic volcanics in the western part of the claim group.

CURRENT WORK

Soil and rock samples, taken from the eastern part of the claims, were analysed for Cu, Pb, Zn and Ag and the claims were mapped at one inch to 500 feet.

BECK AND DERK CLAIMS — 76 G/5
Noranda Exploration Company Ltd., — 65°26'N, 108°50'W
P.O. Box 1619,
Yellowknife, N.W.T.

REFERENCES

Frith (1975); Frith *et al.*, (1977).

PROPERTY

BECK 1, 5-16; DERK 1-3

LOCATION

The claims are 26 miles north-northwest of Regan Lake and 20 miles south of the Yava deposit.

HISTORY

The BECK claims were staked in 1974 over ground which is practically devoid of outcrop but on strike with felsic volcanics. An EM survey flown in 1975 indicated that the contact between the volcanics and the overlying sediments lay along the east margin of the BECK group. The DERK claims were staked to cover this inferred contact and EM anomalies to the west. BECK 1, 6-11 and 13-16 lapsed in 1975, DERK 3 lapsed in 1976.

DESCRIPTION

Except for two small outcrops of biotite granite on DERK 3 in the southeast corner of the claim block, the claims are covered by muskeg and boulder fields.

CURRENT WORK

Geological mapping, magnetometer and EM surveys tested EM anomalies located by the airborne survey. A conductor along the north-trending baseline of the grid was delineated with horizontal loop equipment. A VLF conductor trends slightly east of north across the grid and shows weak coincident magnetic expression. The conductors are probably graphitic phyllites, which elsewhere in the Hackett River greenstone belt, occur between the volcanics and the overlying greywackes of the Yellowknife Supergroup.

MUSK CLAIMS — Copper, Zinc, Lead
Noranda Exploration Company Ltd., — 76 G/5
P.O. Box 1619, — 65°17'N, 107°37'W
Yellowknife, N.W.T.

REFERENCES

Frith and Hill (1975); Frith *et al.*, (1977).

PROPERTY

MUSK 1-9

LOCATION

The claims are 17 miles north of Regan Lake.

HISTORY

MUSK 1-9 were staked to cover EM anomalies outlined by a 1974 airborne survey.

DESCRIPTION

The claims lie in the southeastern part of the Hackett River greenstone belt, about a mile southwest of the contact of the volcanics with overlying metasediments and are mainly underlain by vertically-dipping felsic volcanics. A 200-foot width of a felsic fragmental unit with a carbonate rich matrix is exposed in the northeastern part of the claim block. A gossan striking west to northwesterly lies 500 to 700 feet to the south of the carbonate rich unit. The gossan covers sericitised and sheared rhyolite containing usually less than 5% disseminations and blebs of pyrite, pyrrhotite, chalcopyrite, covellite, sphalerite and galena. Quartz eye rhyolite outcrops in close proximity to the sulphide showing.

CURRENT WORK

A grid in the northeast part of the claim group covers EM anomalies located by the airborne survey. Geological mapping, horizontal- and vertical-loop and

VLF EM surveys outlined a conductor coincident with above background magnetic response and weak residual gravity anomalies along the gossan.

BACK RIVER PROJECT — 76 B/13, 76 F/1, 76 G/4
DuPont of Canada Exploration Ltd., — 64°53' to 65°05'N
102 - 1550 Alberni Street, — 107°40' to 108°12'W
Vancouver, B.C.

REFERENCES
Frith, Fyson and Hill (1977); Lambert (1976, 1977, 1978).

PROPERTY
The claims held by DuPont Canada Exploration Ltd. are listed in Figure V-4.

LOCATION
The various claim blocks are northwest of the Back River, southwest and west of Regan Lake and north of Heywood Range (Figure V-4).

HISTORY
The majority of the claim groups were staked in 1975 to cover anomalies detected by an EM survey flown over the Back River volcanic complex. The SR and SNO claims were staked in 1974.

DESCRIPTION
The 25- by 15-mile, northwest-trending area surveyed includes most of the Back River mafic to felsic volcanic complex.

CURRENT WORK AND RESULTS
The airborne Input EM and magnetometer survey detected discrete conductors and long conductive zones. A continuous "formational" conductor defines an oval structure approximately 12 miles in diameter enclosing a horseshoe-shaped conductive zone approximately five miles in diameter. These crudely concentric structures may be related to cauldron subsidence.

SNO CLAIMS — Copper
DuPont of Canada Exploration Limited, — 76 G/4
102 - 1550 Alberni Street, — 65°01'N, 107°52'W
Vancouver, B.C.

REFERENCES
Lambert (1976, 1978)

PROPERTY
SNO 1-4

LOCATION
The claims are nine miles southwest of Regan Lake (Figure V-4).

HISTORY
The claims were staked in 1974 to cover chalcopyrite and pyrite discovered during prospecting.

DESCRIPTION
Outcrop is sparse in the claims which lie within and near the margin of the Back River volcanic complex. An embayment of Yellowknife Supergroup sediments lying northeast of the claims, extends northwest from the Back River to south of Regan Lake, and partially separates the main body of the Back River Volcanic Complex from the volcanics of the Regan Lake Belt.

CURRENT WORK
Soil samples taken over most of the claim area were analysed for copper, lead, zinc, arsenic, gold and silver. A zone weakly anomalous in base metals was reported. Its relationship to the showing is obscure. One soil sample contained 3.5% As and anomalous concentrations of precious and base metals.

The claims lie just within the margins of an Input EM survey flown in May, 1975.

JUDY CLAIMS — 76 B/13, 76 G/4
DuPont of Canada Exploration Ltd., — 64°59'N, 107°50'W
102-1550, Alberni Street,
Vancouver, B.C.

REFERENCES
Frith *et al.*, (1977); Lambert (1976, 1977, 1978).

PROPERTY
JUDY 1-74

LOCATION
The claims are nine miles southwest of Regan Lake (Figure V-4).

HISTORY
The claims were staked in early 1975. JUDY 1-33, 36-37, 42, 54, 58 and 68-69 lapsed in 1976.

DESCRIPTION
The property covers part of the northeast margin of the Back River Volcanic Complex and is underlain by mafic to felsic metavolcanics and metasediments. Mafic volcanics outcrop at the southwestern margin of the claim block, and metasediments at the northeastern boundary. Felsic volcanics, enclosing a 200 to 1,000 foot wide layer of sediments underlie the centre of the group. The intra-volcanic sediments include lean sulphide, carbonate and oxide iron-formation, graphitic and pyritic shale and greywacke, and outcrop 1,000 to 2,500 feet southwest of the top of the volcanic complex. Tuffs and breccias lying southwest of the intra-volcanic sediment are mostly carbonate cemented. Strikes are northwest and dips vertical or steep to the northeast. Top indications were not observed, but work by Frith *et al.*, (1977) and Lambert (1976) suggests the sequence is overturned.

CURRENT WORK
Geological mapping at a scale of one inch to one quarter mile and samples from gossans contain minor concentrations of gold and arsenic. The gossans sampled cap lean iron formation.

Airborne EM and magnetometer surveys outlined conductors, with and without magnetic correlation, in and adjacent to the intravolcanic sediments.

PROSPECTING PERMITS 328 and 329 — 76 G/2, 3
DuPont of Canada Exploration Ltd., — 65°07'N, 107°00'W
102-1550, Alberni Street,
Vancouver, B.C.

REFERENCES
Gibbins *et al.*, (1977)

PROPERTY
Prospecting Permit 328 76 G/2
Prospecting Permit 329 76 G/3

LOCATION
The permits cover the area southwest of Beechey Lake and east of Regan Lake and enclose Casey Lake.

HISTORY
Prospecting Permits 328 and 329 were acquired in 1974. Mapping and prospecting that year found pyritic chert, pyritic garnetiferous amphibolite and thin seams of pyritic and graphitic schist southeast of Casey Lake containing 0.01 to 0.40% Zn and 0.02% to 0.11% Cu. One sample from this area contained 0.62 oz/ton Au. Interesting gold values were also found in pyritic amphibolite interbedded with metachert to the west.

The eastern half of Prospecting Permit 328 and the southwestern part of Prospecting Permit 329 were released in 1975.

DESCRIPTION
The permit areas are underlain by metasediments that are intruded by quartz-monzonite and, to the northwest, interbedded with chloritic schists, phyllite and mica schists of volcanic derivation. Southeast of Casey Lake, the metasediments include amphibolite, pyritic schists and muscovite, muscovite-biotite and biotite schists. Northeast of Casey Lake, the north and south shores of a long lake are underlain by pelitic metasediments.

In the northeast part of Prospecting Permit 329, psammitic to pelitic metasediments flank, and are conformable with, a 500- to 2,000-foot wide section of mafic and intermediate volcanics. Black slate and metachert, interbedded with the volcanics, locally contain pyrite and arsenopyrite. Silicate-oxide iron-formation and minor sulphide iron-formation outcrop intermittently approximately one mile southeast of the metavolcanics. The 1974 magnetometer survey suggests that the iron formation is a number of discrete lenses.

CURRENT WORK
A 6- by 1.5 mile area in the northeastern part of Prospecting Permit 329 was mapped at 1 inch to 1,250 feet; an area of about 2,000 by 1,600 feet, in the northwest part of this map area, was mapped at 1 inch to 200 feet.

Rock samples from sulphide-bearing black shale and metachert bands, contained little gold, and a soil survey for gold and arsenic did not outline anomalies.

A 10-foot long chip sample, of interbanded black slate and chloritic schist gave the best values: 0.098 oz/ton Au, and 1.0% As.

Geochemical soil and rock sampling surveys on Prospecting Permit 328 were not encouraging and a gold occurrence noted in 1974 could not be found. Rock samples from southeast of Casey Lake were analysed for zinc and gold and soil samples for arsenic and gold. Rock samples from the Long Lake area, northeast of Casey Lake, were analysed for lead, arsenic and gold, and soil samples for arsenic and gold.

HACKETT-BACK RIVER PROJECT — Zinc, Copper, Lead
Cominco Limited, — 76 F/8, 9, 16;
200 Granville Square, — G/5, 12
Vancouver, B.C., V6C 2R2

REFERENCES
Gibbins *et al.*, (1977); Frith and Hill (1975); Frith *et al.*, (1977).

PROPERTY
The claims described under this project are shown in Figure V-5.

LOCATION
The four claim blocks extending northwesterly from west of the Back River to a point some ten miles southwest of the main sulphide zone at the Bathurst Norsemines property are shown on Figure V-5.

HISTORY
Cominco obtained a 90% interest in the CAL 1-117 claims which were staked by Precambrian Mining Services Ltd. in early 1974. Forty-six of these claims lapsed in early 1975. The ELF 1-43, HOUN 1-111 and ORC 1-30 were staked for Cominco Ltd. in 1974 and the remainder of the claims in 1975.

DESCRIPTION
The claim groups cover parts of the Archean Hackett River volcanic belt which consists dominantly of felsic and intermediate volcanic rocks.

ELF, EL, RAM, MAR, ARM AND SKI CLAIMS

These claim groups together form a single block, which extends 13 miles northwesterly of a point two and a half miles northwest of the Yava sulphide deposit. The SKI claims are at the northern end of the block.

A two-mile wide area devoid of outcrops extends across the southeastern part of the SKI claims. North of this overburden are intermediate to felsic volcanics in fault contact to the south with greywacke. The greywacke encloses an oval body of magnetite bearing skarn. South of the covered area intermediate and felsic volcanics are exposed. The latter include crystal tuff, tuff, cherty tuff, minor interbedded chert and locally lenses of agglomerate. Felsic volcanics, abundant in the northern part of the claim group occur to the south as relatively thin layers and lenses within andesite.

The volcanics are tightly folded, and intruded to the southwest along the claim boundaries by granite, granodiorite, and syenite which truncate the folds. The volcanics generally trend northwest and dip moderately northeast, but in the southern part of the area, on the ELF and EL claims they trend parallel to the granite contact and dip steeply southwest and are thus probably overturned locally. A foliation with steep northeasterly to vertical dips is parallel to the strike of the rock units.

Galena, sphalerite and chalcopyrite occur in a pyritic gossan developed over a rhyolitic fragmental in the south-central part of the claim block. The fragmental unit contains felsic fragments in a biotite or chlorite matrix. To the south two pyritic showings in cherty rhyolite tuff contain scattered specks of chalcopyrite. On the SKI claims narrow

layers of disseminated to massive pyrite occur at or near andesite-rhyolite contacts.

CAL, HOUN AND TAP CLAIMS

The CAL, HOUN and TAP blocks are contiguous and extend from two miles to twelve miles south of the Yava sulphide deposit. The claims are mainly underlain by felsic to intermediate volcanics metamorphosed to upper greenschist and lower amphibolite facies. Rhyolite tuff, rhyolitic crystal tuff and cherty rhyolite underlies much of the claim block. Beds of chert are intercalated with these rocks which also host local concentrations of disseminated to massive pyrite, and minor chalcopyrite. Bedded carbonate and carbonate breccia extend from the northeast part of the CAL and HOUN claims northwest into the southern half of the TAP group.

Two volcanic centres were mapped by Cominco; one in the north and one in the south part of the TAP claims.

Greywacke and schist underlie the eastern margin of the CAL group, but lie about 2,000 feet to the east of the TAP claims.

Dips are steep and southwesterly and since on strike to the north dips are northeasterly, some beds are overturned. The distribution of units mapped, as well as opposing top directions observed in pillowed andesite, suggest that the rocks are locally overturned on the limbs of tight folds. Intrusive granite underlying the western margin of the TAP claims truncates the lithological units mapped.

SKI CLAIMS

The SKI claims are 2 km east of the Yava deposit, one half km south of the ELF, and 3 km northwest of the TAP on the western boundary of the Hackett River Volcanic Belt which is bounded on the west by a granitic intrusion. Glacial outwash, as much as 25 m thick, covers about 25% of the property and makes geological interpretation difficult.

Dacite, the main rock type on the property, consists of fine grained, massive units grading to andesite tuffs and pillowed andesite towards the east. Pillowed andesite indicates a submarine environment. The strata trend northerly, dip vertically and face east according to pillow lava shapes.

No base metal mineralization was observed.

DAWN, ORB, ORC, QIK AND WAN CLAIMS

The DAWN, ORB, ORC, QIK and WAN claims together form a single block lying 11 miles southeast of the HOUN claims (Figure V-5).

The most widespread rock types underlying the claims are rhyolite tuff and tuffite. The tuff includes crystal and cherty varieties. Bedded carbonate and limestone breccia underlies less than five percent of the property, but a bedded carbonate unit, mapped by Cominco as much as 1,500 feet wide underlies part of the northeast boundary of the claims. This carbonate unit lies between the volcanics of the Hackett River belt and the overlying greywackes. The rocks strike west to northwest and dip northerly. The foliation generally has steep northerly dips. Isoclinal folding is indicated by easily recognised carbonate units. The property lies near the staurolite-andalusite isograd (Frith, *et al.*, 1977).

Disseminated and massive pyrite occurs in acid members of the volcanic sequence, notably in cherty rhyolite tuff, which also contains small amounts of disseminated sphalerite.

CURRENT WORK

Most of the claims were staked to cover anomalies detected by an EM and magnetic survey, flown over much of the greenstone belt for several companies in 1975. Many of the numerous conductors detected are long formational features.

The gossans were tested by soil and rock geochemistry and the geology was mapped at 1:15,000, except for the SKI claims which were mapped at 1:63,360.

YAVA SYNDICATE PROJECT	Copper, Lead,
Brascan Resources Limited,	Zinc, Silver
Suite 502,	76 F/9, 16,
1155, West Pender Street,	76 G/12
Vancouver, B.C.	66°42'N, 108°05'W

Conwest Exploration Co. Ltd.,
10th Floor,
85, Richmond Street West,
Toronto, Ontario, M5H 2G1

REFERENCES

Bryan *et al.*, (1975); Frith and Hill (1975); Frith *et al.*, (1977); Gibbins *et al.*, (1977); Jefferson *et al.*, (1976); Padgham, Bryan *et al.*, (1975).

PROPERTY

159 GO claims, 238 JK claims, 8 RH claims, 4 SH claims, 43 YV claims.

LOCATION

Claims of the Yava Project extend some thirty miles along the northwesterly striking Hackett-Back River volcanic belt adjoining the Bathurst Norsemines property at its northwest extremity (Figure V-6). With the exception of the SH claims, which lie about 5 miles east of the main block, the claims form a continuous block. They are flanked to the southwest by several Cominco properties described under the Hackett-Back River Project.

HISTORY

The GO and JK claims were staked in 1974 (Gibbins *et al.*, 1977) and the RH, YV and SH in 1975. By August, 1975 all claims had been transferred to Brascan Resources Ltd., who hold them on behalf of the Yava Syndicate.

DESCRIPTION

The dominant rock types underlying the claims are pillowed andesite, andesitic and dacitic pyroclastics, quartz latite and quartz-eye rhyolite. The volcanics, which face northeast, are overlain by metasediments.

Geological investigations by the Yava Syndicate suggest that the Yava Deposit, on the GO claims (App. 65°36'10"N, 107°56'00"W), may be in a caldera complex.

The deposit lies on a silicious volcanic unit that is probably a submarine flow and is overlain by tuffites.

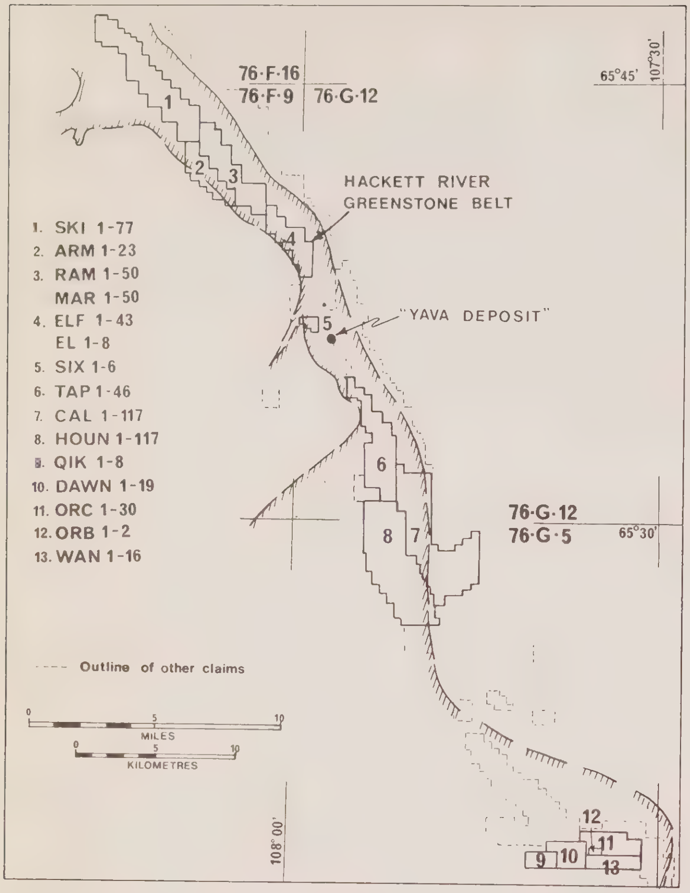


Figure V-5: Location of properties in the Hackett River Belt; Hackett-Back River Project

CURRENT WORK

An airborne EM survey detected conductors on the property but most of these are long and formational and tend to follow the volcanic-sediment contact. Geological mapping was completed on 15 grids at 1:2,400, and on the Main Zone at 1:6,000. Gossans soil and waters on the claims were sampled and the grids were tested by EM, magnetic and gravity surveys.

A total of 2,081 feet was drilled in nine holes. Four, peripheral to the Yava Deposit, were drilled partly on geochemical and partly on geophysical anomalies. Five holes tested EM conductors, one tested a gravity anomaly.

IM CLAIMS — 76 G/5
Brascan Resources Ltd., — 65°25'N, 107°30'W
Suite 502,
1155, West Pender Street,
Vancouver, B.C.

REFERENCES

Frith and Hill (1975); Frith *et al.*, (1977).

PROPERTY

IM 1-38

LOCATION

The claims lie 18 miles southeasterly of the Yava sulphide deposit (Figure V-6).

HISTORY

The claims were staked for the Yava Syndicate in 1974; at a time of much staking along the Hackett River Volcanic Belt.

DESCRIPTION

Most of the property is underlain by metasediments which include some iron formation. A lesser area is underlain by volcanics. Mafic volcanics, striking slightly west of north underly most of the northern arm of the claim block. Greywacke outcrops to the west of the claim within an area previously mapped by Frith *et al.* (1977) as volcanics.

CURRENT WORK

Geological mapping submitted for assessment, covered only the northern arm of the claims. Geochemical work included lake water sampling and sampling of frost boils over gossans. Water samples were analysed for copper and zinc. Frost boil samples were analysed for copper, lead, zinc, silver and gold.

Horizontal loop EM surveys of two grids detected conductors, two of these coincide with anomalous metal concentrations in frost boils.

POL CLAIMS — 76 G/6
Cominco Ltd., — 65°18'N, 107°18'W
200, Granville Square,
Vancouver, B.C., V6C 2R2.

REFERENCES

Frith & Hill (1975); Frith *et al.*, (1977).

PROPERTY

POL 1-14

LOCATION

The property is about 300 miles northeast of Yellowknife and two miles east of the Back River.

HISTORY

The POL claims were staked for Cominco in 1975.

DESCRIPTION

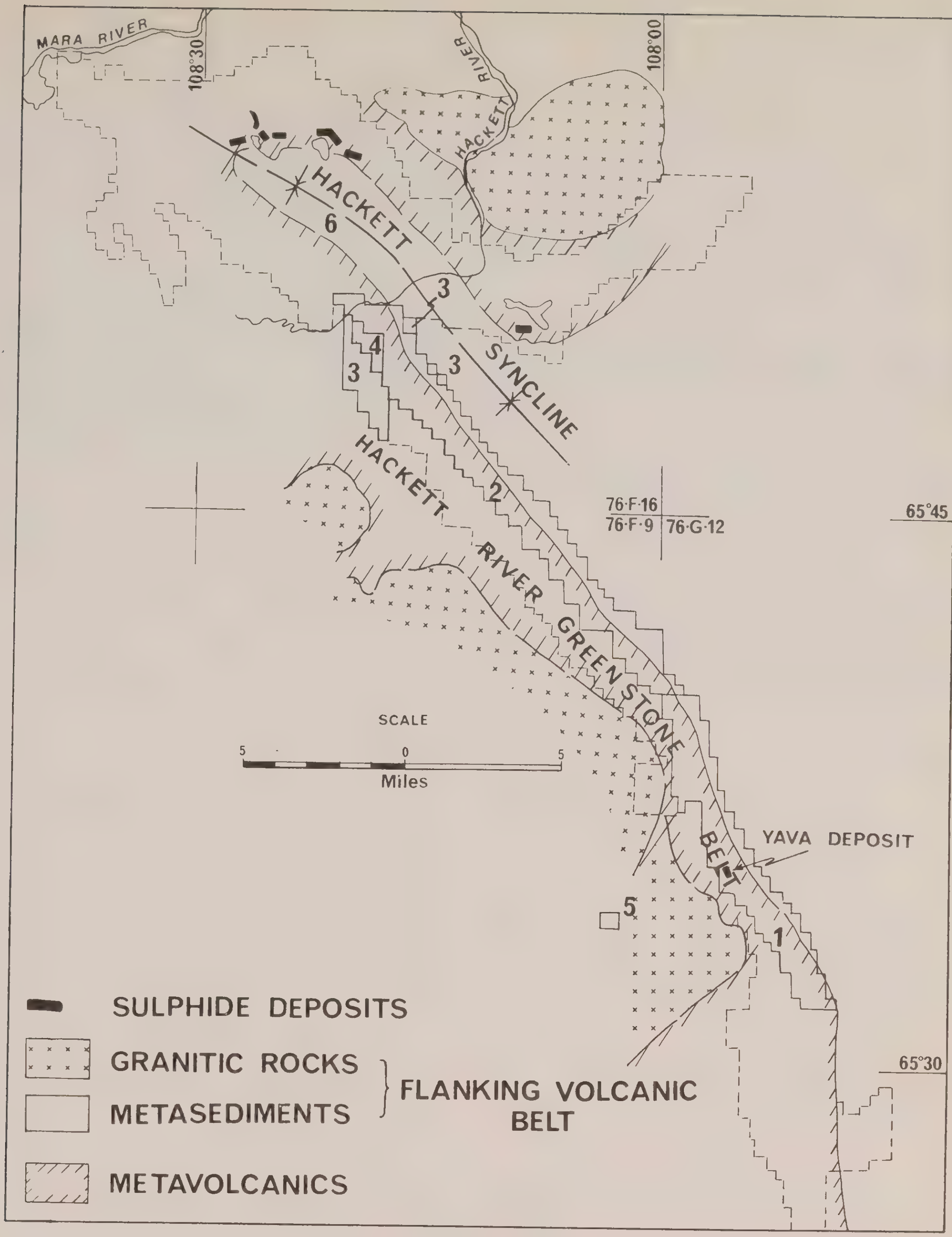
The property is underlain by greywacke, bedded carbonate and shale. Strikes of both bedding and foliation are northwesterly with moderate to steep dips to the northeast.

The carbonate could be of volcanic origin; a thin volcanic unit was mapped on the claims during regional studies (Frith *et al.*, 1977). A thin layer mapped by Noranda Exploration Company Limited on the adjoining SASH and BEE claims as mafic volcanic strikes into bedded carbonate as mapped by Cominco Ltd.

Minor disseminated pyrite found in graphitic shale and in the carbonate unit may be precipitates of volcanogenic affinity.

CURRENT WORK

The property was mapped at 1:31,680 and a few rock and soil samples taken. These were all analysed for copper, lead and zinc. Two were also analysed for gold and silver.



1. GO claims
2. JK claims
3. YV claims
4. RH claims
5. SH claims
6. Bathurst Norsemines Property

Figure V-6: Hackett River Belt and Hackett Syncline; Property Locations

KLIM CLAIMS 76 F/15
Noranda Exploration Company Ltd., 65°57'N, 108°36'W
P.O. Box 1619,
Yellowknife, N.W.T.

REFERENCES
Jefferson, Shegelski *et al.*, (1976).

PROPERTY
KLIM 1-4

LOCATION
The claim group, south of Mara River, adjoins the northern boundary of the Bathurst Norsemines property.

HISTORY
KLIM 1-3 were staked in 1974 to cover conductors found by an EM survey, flown for Cominco in 1970. KLIM 4 was added in 1975.

DESCRIPTION
There are three outcrops on the KLIM claims. One is mafic tuff, one is gabbro and the other is granite. The property lies just west of a granodiorite stock.

CURRENT WORK
A northwesterly-trending VLF-EM conductor located on the claims is coincident with an airborne EM conductor. Geological mapping failed to reveal the cause of the conductor which is apparently parallel to the regional strike and the trend of the granodiorite (Jefferson, Shegelski *et al.*, 1976).

BATHURST NORSEMINES PROPERTY; Silver, Zinc,
BB CLAIMS Copper, Lead
Cominco Ltd., 76 F/16
200, Granville Square, 65°55'N, 108°22'W
Vancouver, B.C., V6C 2R2

REFERENCES
Franklin (1976); Jefferson *et al.*, (1976).

PROPERTY
The Bathurst Norsemines Option consists of 1101 AC, BAT, BB, DC, H, HURST, J, JAR, JO, K, L, LC, LD,M, MAY, ND, OKT, ONO, OX, RN and SK claims.

LOCATION
The claims extend east and west of a major bend in the Hackett River about 300 miles northeasterly of Yellowknife (Figures V-6, V-7).

HISTORY
Most of the claims were staked in 1970 and 1971. By the end of 1975, 29 H, 57 J, 6 JAR, 9 MAY and 43 LC claims had lapsed.

DESCRIPTION
The silver-base metal deposits of the Bathurst Norsemines Property occur near the top of a sequence of intermediate to felsic volcanics which overlie metasediments of the Hackett River gneiss dome. The sulphide deposits are in a band of cherty tuffite chert and cherty rhyolite. There are calc-silicate outcrops near the sulphides. The calc-silicate is mainly coarse grained diopside. Mill rock, which may be of laharic origin (Franklin, 1976), is abundant in the footwall of the sulphide bodies. Sillimanite porphyroblasts are abundant in a unit mapped by Cominco geologists as sillimanite tuffite. Spectacular pink garnets, some over half an inch in diameter are abundant in the alteration pipe beneath the A-zone sulphide deposit on the north side of Camp Lake. Silicification and sericitisation locally give rise to a lacy chicken wire texture in the alteration pipe. Anthophyllite and cordierite is also abundant within the alteration zone; the cordierite giving rise to spotted rock. Massive to disseminated pyrite, pyrrhotite, sphalerite, chalcopyrite and galena, locally with gahnite consititute the mineralization.

CURRENT WORK
A total of 3,210 feet in seven holes was drilled. Three holes were drilled at the northwest end of Camp Lake of BB 53, two were drilled near the northern tip of Camp Lake, on BB 52 and two near the southeast end of Camp Lake on BB 21 and 22. The first five holes tested the A zone and the last two explored the JO zone. All encountered typical lithologies, disseminated sulphides and in three holes substantial widths of massive sulphides.

PROSPECTING PERMIT 358 Cu, Pb, Zn
Uranerz Exploration & Mining Ltd., 76 N/6
Suite 1000, 67°23'N, 109°15'W
540 - 5th Avenue S.W.,
Calgary, Alberta.

REFERENCES
Fraser (1964); O'Neill (1924); Wright (1957).

PROPERTY
Prospecting Permit 358

LOCATION
The permit is west of the Hood River and Arctic Sound. Bathurst Inlet Lodge is 50 miles to the southeast (Figure V-2).

DESCRIPTION
The Bathurst Fault along which proterozoic rocks are in contact with Yellowknife Supergroup Archean metasediments bisects Permit 358. Probably the original exploration target was uranium but current exploration is for base metals. Mineralization is in fractures associated with the Bathurst Fault or in black shales that may be of Archean age. Since the Bathurst Fault with which mineralizations is associated postdates Archean rocks of the Slave Province, it seemed inappropriate to include Permit 358 under the heading of Eastern Slave Province and it has been reported in the Kilohigok Basin section.

Volcanic Belt Reconnaissance 76 O
Cominco Ltd., 67°45'N, 106°35'W
200 Granville Square,
Vancouver, B.C., V6C 2R2

REFERENCES
Fraser(1964).

LOCATION
The volcanic belts lie west of Bathurst Inlet in the northeastern segment of the Slave Province.

DESCRIPTION
The main belt extends southerly for 48 miles from Hope Bay (Fraser *et al.*, 1963). It varies in

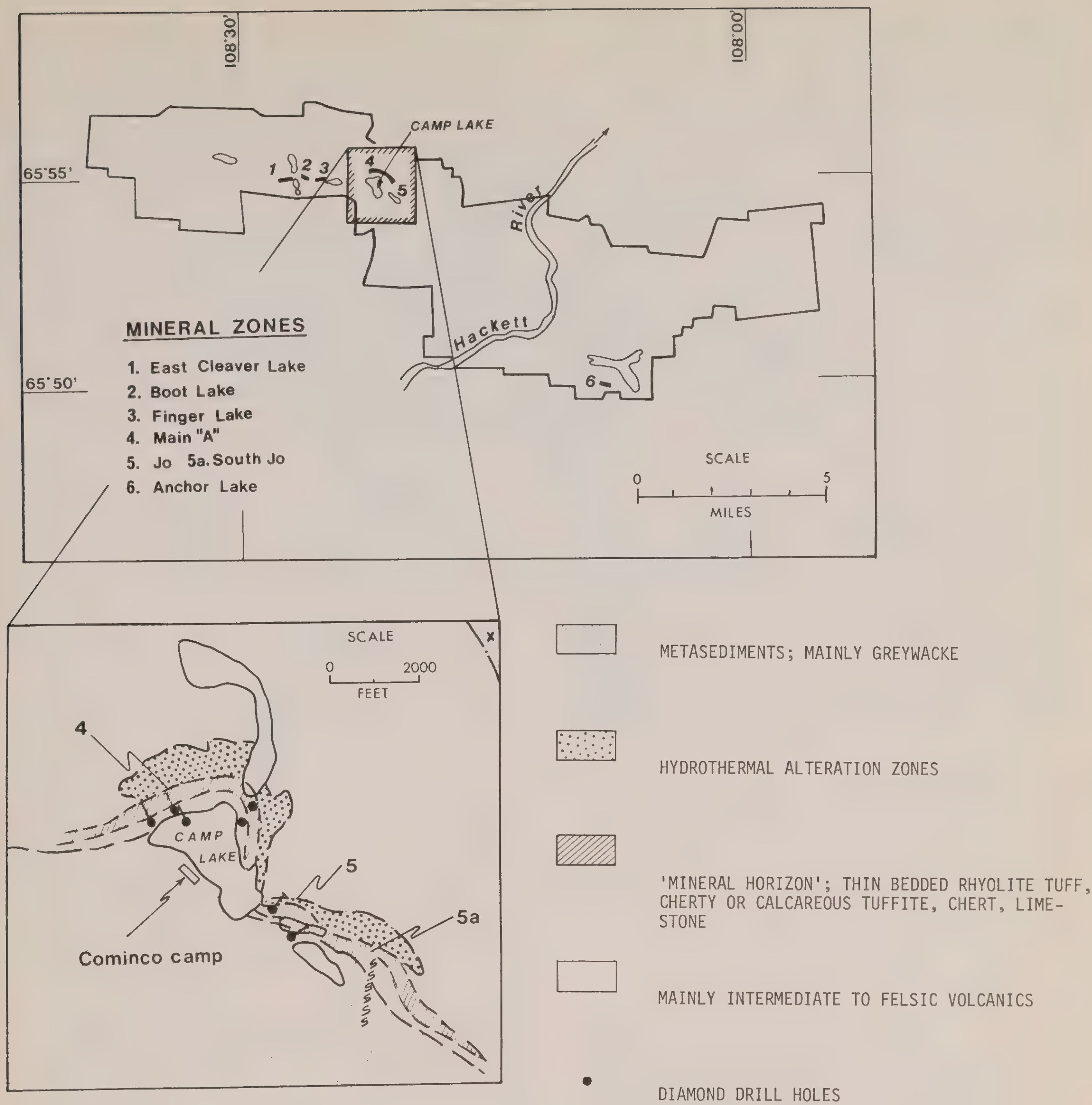


Figure V-7: Bathurst Norsemines Property and location of 1975 drilling

width from 6 to 12 miles and is composed dominantly of mafic pillowed lavas. Silver and gold deposits have been explored in the belt, but base metal showings are not common. Quartz carbonate shear zones are abundant in the belt and give rise to numerous gossans.

CURRENT WORK

Three Cominco geologists used a helicopter for about 10 days to check the belt for felsic volcanics that might host base metal deposits. No claims were staked and apparently nothing further was done.

NORTHERN SLAVE PROVINCE

Figures V-8, V-9, V-10 and V-11 show the subdivisions and nomenclature used in grouping the 27 projects conducted in the Northern Slave Province. Nineteen of these were on the Run Lake Belt or its southeast branch and on the High Lake Belt; two projects were on the Takijuq Lake south segment and one on the Hawk Lake Belt (Figures V-8, V-9 and V-10). The remaining five projects were on the Point Lake-Itchen Lake supracrustal belt (Figure V-11).

Mapping at one inch to eight miles (Craig *et al.* 1960; Fraser 1964) covers the area. The Point Lake-Itchen Lake area and the northeasterly trending Olga Lake Belt have been remapped and presented at one inch to two miles (Bostock 1976). Some additional specific or local references are given with individual project reports.

WH CLAIMS — 76 L/3
Texasgulf Inc., — 66°12'N, 111°20'W
Box 174,
5000 Commerce Court West,
Toronto, Ontario, M5L 1E7

REFERENCES
Fraser (1964)

PROPERTY
WH 1-4

LOCATION
The claims lie 9 miles west of Kathawachaga Lake.

DESCRIPTION
WH 1-4 cover part of an Archean volcanic belt which extends southwest into the ground held by Long Lac Mineral Exploration Ltd. under Prospecting Permit 336. The volcanic belt is referred to as the 76 L southwest segment in Figure V-8.

CURRENT WORK AND RESULTS
Samples taken generally from the B-soil horizon every 100 feet on the claims were analyzed by hot acid extraction and atomic absorption. Statistical treatment of the copper, zinc, lead and silver values suggests some are anomalous.

PROSPECTING PERMIT 336 — Copper, Zinc, Lead
and THREE HOUR LAKE AREA — 76 L/4, 5
Long Lac Mineral Exploration Ltd., 66°07'N, 111°40'W
Suite 1900,
101 Richmond Street West,
Toronto, Ontario, M5H 1T1

REFERENCES
Gibbins *et al* (1977)

PROPERTY
Prospecting Permit 336

LOCATION
The centre of the area of Prospecting Permit 336 lies about 25 miles west of the centre of Kathawachaga Lake (Figure V-8). The Three Hour Lake area, about 15 square miles, is centred at 66°20'N and 111°52'30"W, a few miles north of the Prospecting Permit.

HISTORY
The area was held as Prospecting Permit 60 by N.H. Ursel from 1968 to 1971. Borealis Exploration Ltd. performed geological mapping, airborne geophysics and ground work in 1969 and 1970. Long Lac Mineral Exploration obtained Prospecting Permit 336 in 1974 and that year mapped half of the area. The half mapped is mainly underlain by volcanic rocks (Gibbins *et al.*, 1977). A sphalerite-galena showing near Dogbone Lake and an area at Pogo Lake (Table V-V) were tested by geochemical surveys.

DESCRIPTION
In the west central part of the permit area near the Pogo Lake showing detailed mapping revealed that exhalative carbonate beds, and associated quartz magnetite iron formation lying between a thick accumulation of porphyritic felsic volcanics and metasediments, which are mainly greywackes, are tightly folded along northeasterly axes and cut by northeast striking faults. The stratigraphic relationship between the felsic volcanics around Pogo Lake, and the more mafic volcanics to the north was not determined.

In the 'L Oubli-Dogbone-Platypus' Lakes area (Table V-5), easterly-striking mainly pyroclastic intermediate volcanics enclose minor mafic and felsic beds. The felsic units include cherty and sericitic rhyolite. The chalcopyrite-sphalerite-galena showing at Dogbone Lake is in a gossanous outcrop of rhyolite crystal tuff and pyritic quartz-sericite schists.

Three Hour Lake is underlain by mafic intermediate and minor felsic volcanics surrounded by granitic rocks.

CURRENT WORK
Detailed geological and geophysical surveys tested several anomalies mainly located by airborne EM and magnetic surveys. Ground geophysics included horizontal loop and VLF EM and magnetometer surveys. Soil sampling on the Dogbone Lake grid located two copper-zinc-lead anomalies.

The Three Hour Lake area was geologically mapped at one inch to one mile scale.

TABLE V-5

Unofficial names used by Long Lac Mineral Exploration Ltd. and referred to in text

Name	NTS	Lat.	Long.
Dogbone Lake	76 L/4	66°09'	111°39'
L'Oubli Lake	76 L/4	66°08'	111°37'
Platypus Lake	76 L/4	66°10'	111°42'
Pogo Lake	76 L/4	66°05'	111°55'
Three Hour Lake	76 L/5	66°20'	111°52'
Long Lake	76 L/10	66°44'	111°57'
Rainbow Lake	76 L/10	66°33'	111°37'
Ray Lake	76 L/10	66°32'	110°39'
Thor Lake	76 L/10	66°34'	110°43'
Hog Lake	76 L/15	66°52'	110°25'

CAD, TB CLAIMS — Ilmenite
GUMBO LAKE ILMENITE PROJECT — 76 L/6
Long Lac Mineral Exploration Ltd., 66°18'N, 111°12'W
Suite 1900,
101 Richmond Street West,
Toronto, Ontario, M5H 1T1

REFERENCES
Fraser (1964)

PROPERTY
21 CAD; TB 1-24

LOCATION
The claims are 10 miles northwest of Kathawachaga Lake (Figure V-8).

HISTORY
The TB and CAD claims were staked in 1974 by W. Johnson and P.C. Robinson who remained the

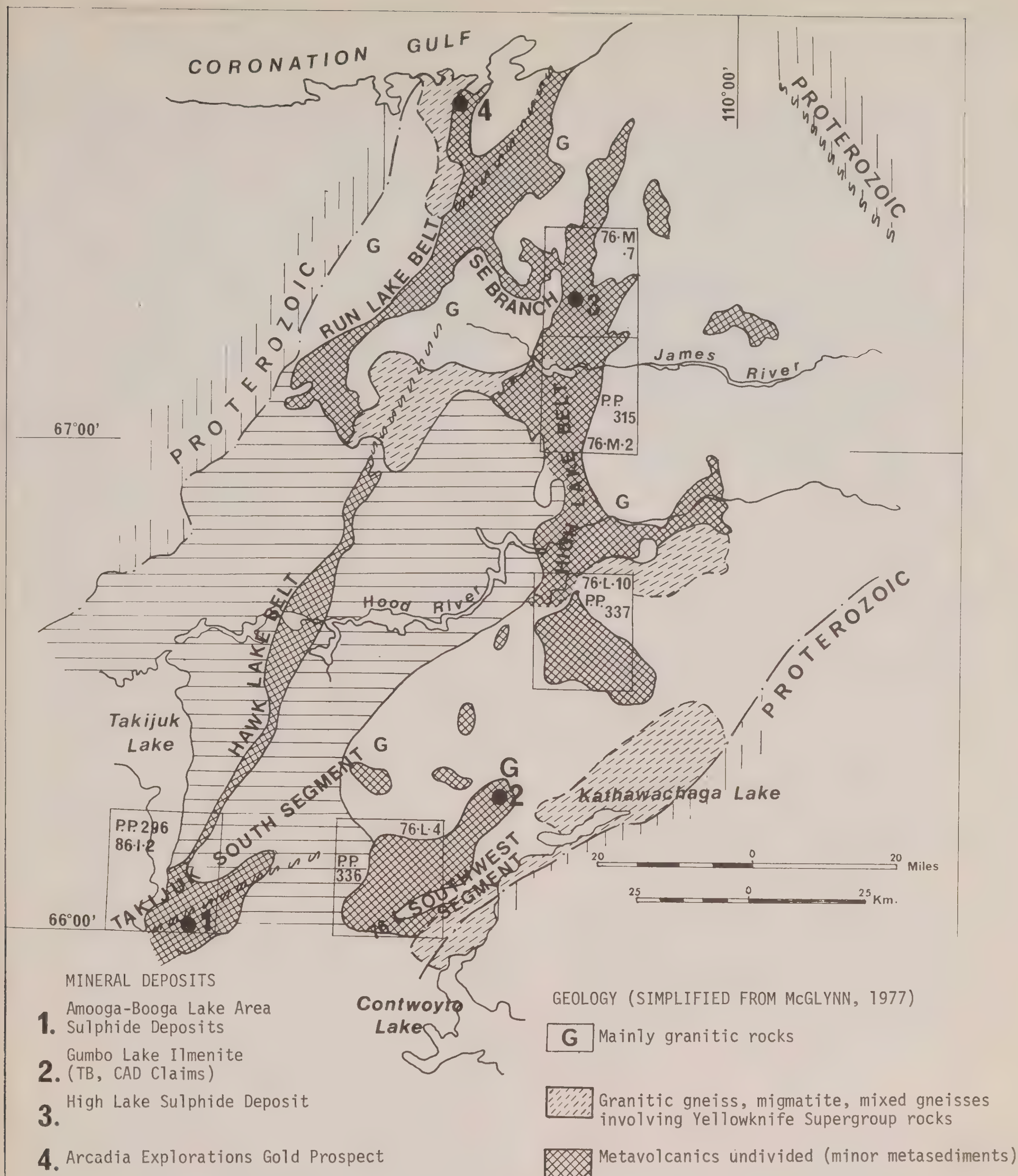


Figure V-8: Northern Slave Province showing location of supracrustal belts and nomenclature used in this report in grouping projects

registered owners under a joint venture agreement with Long Lac Mineral Exploration Ltd. Assessment work was filed on 12 claims. In late 1976, 15 CAD and 18 TB claims lapsed.

DESCRIPTION

Regional mapping in the Kathawachaga Lake area by Long Lac Mineral Exploration Ltd. in 1974, covered a belt of metavolcanics and metasediments three to five miles wide and twenty miles long, extending northeasterly from the eastern boundary of Prospecting Permit 336 (74 L/4). The supracrustal belt is bounded on both sides and at its northeastern extremity by granitic rocks. A southwesterly-trending tongue of granitic rocks, extending for nine miles from the southeastern margin of the belt separates the volcanics to the northwest from a strip of metasediments. From the northwest, mafic volcanics pass into intermediate volcanics which in turn pass into younger sediments. This zonation does not represent a homoclinal sequence, the succession and distribution of map units, partly results from isoclinal folding. In the southeastern part of the belt, quartz-magnetite iron formation and exhalative carbonate lies at or near the contact between dacitic metavolcanics and quartz-feldspar-biotite paragneisses and schists. At the northern end of the belt the metasediments contain abundant sillimanite.

The TB and CAD claims cover an ilmenite-bearing gabbro at the northern end of the volcanic belt. The mafic intrusive complex on the claims was subdivided into diabasic gabbro, normal gabbro, leucogabbro, porphyritic gabbro and ilmenite-bearing rocks. Two ilmenite bearing bodies, about a quarter of a mile apart, appear to underlie 600,000 square feet of the eastern grid and 360,000 square feet of the western grid. Locally ilmenite makes up 70% of the rock.

CURRENT WORK

One inch to one mile mapping and prospecting covered the area between the TB and CAD claims, and Prospecting Permit 336. Four square miles of the TB-CAD claims were mapped at one inch to one quarter mile. The east and west grids, covering the ilmenite occurrences, within this area, were mapped at one inch to 50 feet. An EM survey over the west grid roughly outlined ilmenite rich areas. Half of the 105 chip samples collected from the two grids were lost in a laboratory fire but a rough estimate of 61,550 tons per vertical foot of 18.42% Fe, 0.22% V, 11.86% Ti was made for the eastern grid. The few samples assayed from the western grid suggest a grade equivalent or better than that of the eastern grid deposit. Gabbroic to ultramafic rocks with 25% fine-grained pyrrhotite contain traces of copper and nickel.

PROSPECTING PERMIT 337 76 L/10
Long Lac Mineral Exploration Ltd., 66°38'N, 110°50'W
Suite 1900,
101 Richmond Street West,
Toronto, Ontario, M5H 1T1

REFERENCE

Gibbins *et al.*, (1977).

PROPERTY

Prospecting Permit 337

LOCATION

The centre of the prospecting permit lies 12 miles south of the Hood River and 30 miles north of Kathawachaga Lake (Figure V-8).

HISTORY

The ground, held by N.H. Ursel from 1968 to 1970 as Prospecting Permit 61, was mapped, prospected and surveyed with airborne EM, magnetometer and gamma ray spectrometer systems by Borealis Exploration Ltd. Some of the geophysical anomalies were explored on the ground in 1970.

Prospecting Permit 337 was granted in 1974 to Long Lac Mineral Exploration Ltd. who prospected gossans and mapped three quarters of the permit area, mainly the part underlain by supracrustal rocks.

DESCRIPTION

Prospecting permit 337 covers the south end of the High Lake greenstone belt and is underlain by mainly south to west facing mafic to intermediate volcanics enclosing lesser amounts of felsic volcanics. To the south greywackes and argillites overlie the volcanic sequence.

One inch to one quarter mile mapping of the Ray and Rainbow Lakes area, southeast of Thor Lake (Table V-5) outlined a three mile long three quarter mile thick east striking felsic, mainly pyroclastic unit, immediately east of Ray Lake. The felsic volcanics interfinger laterally with intermediate volcanics and are bounded to the south by a thin layer of graphitic slate and chert which is in turn overlain by south facing pillowed mafic and intermediate volcanics. The pillowed volcanics are exposed over a width of about 1,500 feet and are overlain by a thin layer of cherty and graphitic sediments, in turn overlain by a thicker sequence of quartz feldspar-biotite gneisses and schists with cordierite-muscovite knots. Pyrite and pyrrhotite have been noted in the cherty graphitic beds and minor chalcopyrite in the felsic volcanics.

Detailed mapping of the Long Lake area identified a northeasterly trending 6,000 foot thick unit of felsic volcanics east of Long Lake. This unit is flanked by intermediate volcanics and by mafic intruisves locally, on its southeast side. A chalcopyrite showing in gabbro, and silver-copper-zinc-lead sulphides in rhyolite and carbonate float were found. Some sulphides in this area, as on the Eve Lake grid, occur in shear zones rather than a particular rock unit.

In the North Arm area, which is in the north central part of the Permit, intermediate volcanics, underlying most of the 35 square miles mapped, are bounded by mafic volcanics to the east and granitic rocks to the west. A 500-foot wide sequence of felsic volcanics, which include some coarse grained pyroclastics, trends north in the southeastern part of the North Arm area. Felsic volcanics with several gossans formed on pyritic and sericitic schist trend northwest in the northeastern part of the area where pyrite and pyrrhotite are the only sulphides found.

CURRENT WORK

An EM and magnetic survey was flown over a 70 square mile area in the south part of the permit area. Numerous conductors were detected in the eastern part

of the survey area which was then mapped at one inch to one quarter mile scale. The 20 square mile area mapped is underlain by three bodies of felsic volcanics in a sequence of intermediate to mafic volcanics and metasediments. Conductors were found within and along strike from these felsic accumulations. Detailed geological mapping, ground EM and magnetometer surveys explored felsic volcanics at Ray Lake and Rainbow Lake (Table V-5). The soils on Ray Lake grid were sampled.

Geological mapping in the North Arm area covered about 55 square miles, at one inch to one quarter mile.

Near Long Lake a five by two mile area extending northwards and including the SPOT and DEAN claims, was mapped at one inch to 1,000 feet. The Eve Lake grid, in the southern part of the Long Lake map area, was explored by one inch to 200 feet scale geological mapping and an EM survey.

DEAN AND SPOT CLAIMS — Copper, Zinc, Lead
Long Lac Mineral Exploration Ltd., — 76 K/15
Suite 1900, — 66°46'N, 110°55'W
101, Richmond Street West,
Toronto, Ontario, M5H 1T1

REFERENCES
Fraser (1964)

PROPERTY
DEAN 1-10; SPOT 1-4

LOCATION
The claims are centred about 1.5 miles north of Prospecting Permit 337 and 1.5 miles south of the Hood River. The DEAN group lies 1,000 feet north of the SPOT claims.

HISTORY
The DEAN claims, staked in mid 1975 by W.Johnson, were explored for Long Lac Mineral Exploration Ltd. The SPOT claims were staked in late 1975 for Long Lac Mineral Exploration Ltd. Nine SPOT and 18 DEAN claims were added to the groups in late 1976.

DESCRIPTION
Northeasterly-striking sheared andesitic tuffs, with abundant black chlorite alteration and enclosing several units of felsic pyroclastic breccia as much as 500 feet thick underlie the DEAN claims. A 200 foot wide gossan of rusty boulders containing disseminated to massive pyrrhotite and minor chalcopyrite and sphalerite extends for roughly 1,000 feet north-northeasterly.

The SPOT claims were staked to cover gossans in the southern part of the High Lake Belt (Figure V-8) and are underlain by felsic volcanics flanked by massive andesite. The gossans are within and along the southeast edge of the felsic volcanics, where pyrite and pyrrhotite are abundant. Minor amounts of sphalerite, galena and chalcopyrite were found in carbonate-rich layers enclosed in andesite.

The rocks north of the permit boundary are displaced to the north-northeast on a northwest-striking fault.

CURRENT WORK
The DEAN and SPOT claims were covered by one inch to 1,000 foot mapping that extends into Prospecting Permit 337.

An EM survey of an area with gossans in the northwestern part of the DEAN claims detected conductors presumed to be in the overburden. An EM survey on a grid in the centre of the SPOT group detected a good conductor and an EM survey of the No Lake Grid, half a mile east of the DEAN group located a conductor coincident with a gossan within felsic volcanics.

NORTH MARE PROSPECT — Gold
Long Lac Mineral Exploration Ltd., — 76 L/15
Suite 1900, — 66°52'N, 110°53'W
101, Richmond Street West,
Toronto, Ontario, M5H 1T1

REFERENCES
Fraser (1964)

PROPERTY
MARE 1-28

LOCATION
The claims are four miles north of the Hood River, about 335 miles northerly of Yellowknife.

HISTORY
MARE 1-28, staked by W.Johnson in the spring of 1975, were examined for Long Lac Mineral Exploration.

DESCRIPTION
The property lies in the High Lake greenstone belt (Figure V-8), an assemblage of Archean mafic to felsic volcanics and sediments. A small rusty showing containing 10 to 20% arsenopyrite and 5 to 10% pyrite and pyrrhotite, yielded assays of 0.20 and 0.27 oz/ton Au from two grab samples.

CURRENT WORK
Trenching of the showing was not successful owing to water problems and the few samples collected did not contain much gold.

HOG CLAIMS — 76 L/16
Long Lac Mineral Exploration Ltd., — 66°52'N, 110°25'W
Suite 1900,
101, Richmond Street West,
Toronto, Ontario, M5H 1T1

REFERENCES
Fraser (1964)

PROPERTY
HOG 1-95

LOCATION
The claims lie on the north shore of Hood River, at its junction with Wright River.

HISTORY
The claims, staked late in 1974 by W. Johnson and P.C. Robinson following reconnaissance mapping, were explored for Long Lac Mineral Exploration Ltd. The HOG 96-107 claims were added to the property and 64 of the original claims lapsed in late 1976.

DESCRIPTION

HOG 1-95 cover part of a local felsic accumulation in the roughly four-mile wide Hood River belt of intermediate to mafic volcanics. This belt extends east-northeasterly from the High Lake belt for 18 miles along the Hood River (Figure V-8). Northerly and easterly striking fold axes intersect near the claims which are in the western part of the Hood River belt where the transition from the dominantly northerly structural trends of the High Lake belt to the easterly trends of the Hood River belt are well displayed. The rocks show more than one period of folding. The axis of an anticline is bent around a lobe of batholithic granitic rock which extends northwest into the Hood River greenstone belt, southwest of the HOG claims. The same anticline is abruptly truncated by intrusive granitic rocks of the batholith further to the southwest, five miles from the claims. In the eastern part of the area the anticline and another with the same arcuate trend are covered by gabbro, intrusive into mafic volcanics that appear to be overlain by intermediate volcanics. The axial zone of the syncline between the anticlines contains a one quarter mile wide unit of graphitic shales continuous along strike with shales and greywacke-type metasediments exposed on and north of the HOG claims.

The most common rock on the claims is quartz-eye rhyolite. Volcanic breccia is found on two grids in the south part of the claims and carbonate-rich exhalative sediments in small areas in the centre of the property within an area otherwise underlain by felsic volcanics. Exhalative sediments are also found at or near the contact between felsic volcanics and shales which flank the volcanic pile to the northwest. Massive pyrrhotite occurs along a lineament within the sediments.

CURRENT WORK

Twelve and a quarter square miles were surveyed by airborne EM and grids were set over four anomalies. A VLF EM survey on one grid located massive pyrrhotite containing minor silver, copper, zinc and lead values. EM and magnetometer survey results were more encouraging on the remaining three grids. On grids 1 and 2 in the southern part of the claims good conductors with coincident or flanking magnetic features were outlined.

Mapping of the claim block at one inch to 1,000 feet modified earlier regional mapping; some dacite was remapped as rhyolite and the area previously mapped as underlain by exhalative rocks was reduced considerably. Grids 1 and 2 were mapped at one inch to 200 feet.

HOLE CLAIMS — 76 M/2
Kennarctic Exploration Ltd., — 67°07'N, 111°05'W
Suite 730,
505 Burrard Street,
Vancouver, B.C.

REFERENCES

Fraser (1964).

PROPERTY

HOLE 1-17

LOCATION

The property is 40 miles south of Grays Bay.

HISTORY

HOLE 1-15 (Figures V-8, V-9) were staked in 1974, two more were staked in 1975.

DESCRIPTION

The property covers part of the High Lake greenstone belt and is underlain by intermediate to felsic metavolcanics and metasediments.

CURRENT WORK AND RESULTS

Detailed mapping of the claims in 1975 show they are underlain by rhyolite, dacite and andesite flows and tuffs interbedded with mudstone, siltstone, quartzite, chert and minor shale and carbonate. Two predominantly sedimentary units were defined: a shale-siltstone sequence composed of black shale and shaley, cherty and carbonate-rich siltstone and an iron-formation including thin layers of magnetite in cherty siltstone, thin layers of siderite in carbonate-rich siltstone and pyrite-pyrrhotite layers in shale and shaley limestone. Strongly leached gossans have formed on the sulphide iron formation. Diorite and diabase intrude the supracrustal sequence.

Nearly nine miles of horizontal-loop EM and magnetic surveys along lines 400 feet apart outlined three strong EM and coincident magnetic anomalies. These were attributed to magnetite and pyrrhotite concentrations.

Thirty-seven rock chip samples and 466 soil samples were collected. The chip samples contained as much as 0.5% Cu and 0.42% Zn, and minor lead, silver and gold.

Four holes, totalling 940 feet, were drilled to test geophysical and geochemical anomalies. Minor chalcopyrite and sphalerite, as thin coatings on carbonate-filled fractures and as disseminations are not restricted to any particular horizon and occur throughout the drill core.

PIE CLAIMS — 76 M/6
Kennarctic Explorations Ltd., — 67°26'N, 111°10'W
Suite 730,
505, Burrard Street,
Vancouver, B.C.

REFERENCES

Fraser (1964)

PROPERTY

PIE 1-8

LOCATION

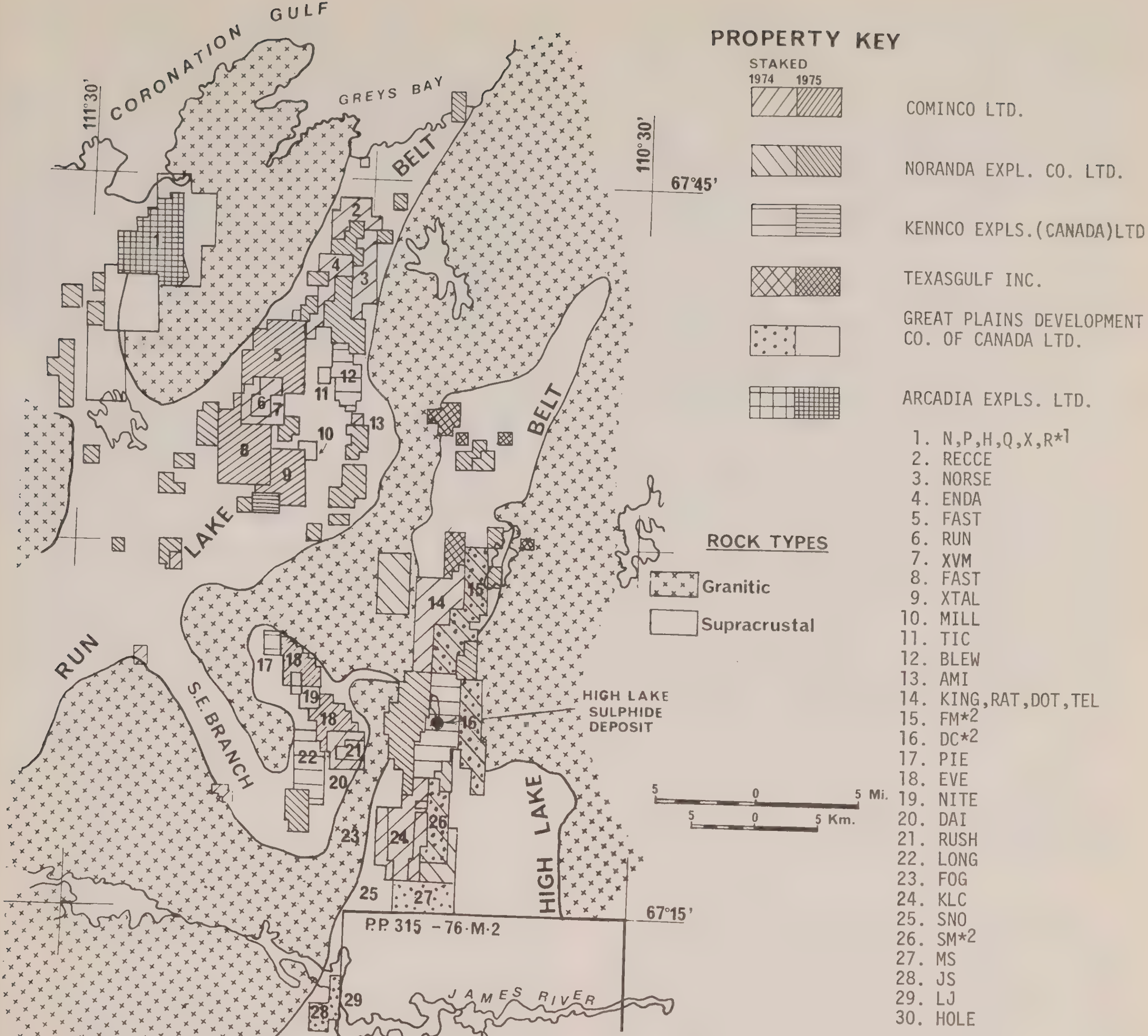
The claims are 20 miles south of Grays Bay (Figures V-8, V-9).

HISTORY

PIE 1-8 were staked in August, 1974.

DESCRIPTION

The property is underlain mainly by massive rhyolite flows, cherty and chloritic rhyolite and bedded cherty siltstone or tuff of the Archean High Lake greenstone belt. Locally, the felsic units are intercalated with epiclastic, intermediate ash tuff. Fine-grained quartz porphyry interbedded in the felsic sequence, may be intrusive. Granite, minor diorite and gabbro and younger diabase dykes intrude the volcanic sequence.



*1 Optioned to Giant Yellowknife Mines Ltd.

*2 Optioned by Great Plains Development Co. of Canada to Noranda Expl. Co. Ltd.

Figure V-9: Property map of northern High Lake and Run Lake supracrustal belts

CURRENT WORK AND RESULTS

Geological mapping, 4.7 line miles of geophysical and geochemical surveying along lines 400 feet apart and trenching were done in 1975.

Concordant sulphide lenses, containing 5 to 100% sulphides, are common in the siltstone tuff unit and give rise to prominent gossans. The main sulphides are pyrite and pyrrhotite, with trace amounts of chalcopyrite, as coatings on fractures and as local concentrations.

The horizontal-loop EM and magnetic surveys outlined a significant conductor with a coincident magnetic anomaly and several magnetic anomalous gossans.

A 179-sample frost boil and gossan soil survey failed to outline anomalies other than the gossans. One of the grab samples taken from the various test pits contained 3,750 ppm Cu and 6.2 ppm Ag, the remainder of the samples did not contain high concentrations of metals.

PROSPECTING PERMIT 315 76 M/2
Great Plains Development Company 67°07'N, 110°45'W
of Canada Ltd.,
715, 5th Av. SW,
Calgary, Alberta, T2P 2X7

Rio Tinto Canadian Exploration Ltd.,
2600, 120 Adelaide Street W,
Toronto, Ontario, 15H 1W5

REFERENCES
Fraser (1964); Johnson (1974); Padgham *et al.*, (1974).

PROPERTY
Prospecting Permit 315

LOCATION
The permit area straddles the James River in the High Lake volcanic belt 45 miles south of Grays Bay (Figs. V-8, V-9).

HISTORY
From 1955 to 1957 Kennarctic Explorations Ltd. did geological mapping, airborne EM and magnetics, ground geophysics and diamond drilling on their James River Reservation which overlaps the area of Prospecting Permit 315. In 1957, Pan American Ventures did geological mapping in the vicinity of LJ Lake. In 1967, Harrons Development Ltd. did geological mapping, geochemical sampling and trenching on the A, B and RIVER claims. In 1969, Polar Star Mines did geological mapping, IP and ground EM surveys south of Ced Lake. In 1974, Great Plains Development Company of Canada Ltd. and Rio Tinto Canadian Exploration Ltd. acquired Prospecting Permit 315 and prospected and mapped the 76 M/2.

DESCRIPTION
The permit area is underlain by the High Lake greenstone belt, an assemblage of Archean mafic to felsic volcanics and sediments with minor iron formation that is intruded by felsic and mafic plutons.

CURRENT WORK AND RESULTS
In June, 1975 Questor flew EM and magnetic surveys totalling 945 line miles along lines 1,000 feet apart. Twenty-five conductors were selected, on the basis of their strength and magnetic correlation, for detailed surface examination and horizontal loop ground geophysical survey. All but one of the conductors correspond to graphitic beds, iron formation, massive pyrite lenses, or sulphide enriched intrusive contacts. One conductor, Zone 21, coincides with fault-controlled sulphide zones containing as much as 40% massive pyrite, pyrrhotite, minor chalcopyrite and sphalerite. Soil samples from the numerous gossans contained as much as 420 ppm Pb and 825 ppm Zn.

Samples from seven trenches across gossans near Claim and Zn lakes contained minor amounts of copper, lead and zinc. One sample contained 0.46 oz/ton Au.

Geological mapping and prospecting at 1:31,680 indicate that the mafic sequence includes massive and chloritized pillow basalts and mafic tuffs containing brown carbonate. The intermediate volcanics include andesite and dacite tuffs and some massive lava flows. Coarse breccias are common and thin graphitic shale lenses occur as interbeds. The intermediate volcanic rocks are moderately silliceous, commonly carbonatized and locally chloritized and sericitized. The felsic sequence includes massive porphyritic lavas, tuffs, agglomerates and coarse breccias. Quartz eyes and sericitic alteration are common. The sedimentary sequence consists of greywacke, slate and iron formation. The greywacke is a gneissic rock with local remnant sedimentary structures; the slate is black, graphitic, pyritic, strongly sheared and locally grades into iron formation containing as much as 30% oxides and sulphides. Granite, quartz-monzonite and granodiorite and diabase dykes intrude the supracrustals. A major north-trending fault and numerous minor faults were traced on the property. Disseminated and massive pyrite occur in the volcanic rocks, iron-formation, black slate and along intrusive contacts and fault lineaments. Quartz veins, pyrite-rich zones and fracture zones contain chalcopyrite, sphalerite, galena, pyrrhotite, tetrahedrite and arsenopyrite.

JA, LJ CLAIMS 76 M/3
Great Plains Development Company 67°11'N, 111°02'W
of Canada Ltd.,
715, 5th Avenue S.W.,
Calgary, Alberta, T2P 2X7

Rio Tinto Canadian Exploration Ltd.,
2600, 120 Adelaide Street W,
Toronto, Ontario, 15H 1W5

REFERENCES
Fraser (1964)

PROPERTY
JA 1-17; LJ 1-18

LOCATION
The LJ claims straddle the James River, the JA claims are just to the south (Figs. V-8, V-9).

HISTORY
The JA and LJ claims were staked in September and August, 1974 following reconnaissance mapping. Pan American Ventures in 1957, Harrons Development Ltd. in 1967 and Polar Star Mines in 1969 mapped, trenched and did geophysical surveys on the area covered by the LJ claims.

DESCRIPTION
The claims cover northeast-trending intermediate to felsic Archean metavolcanics, of the High Lake belt, which are flanked by granitic intrusives.

CURRENT WORK AND RESULTS
In June, 1975, a major EM and magnetometer survey totalling 945 line-miles was flown along lines 1,000 feet apart over Prospecting Permit 315 and the adjacent claim groups. Anomalies were tested with horizontal-loop EM, mapping, trenching and sampling. A 4-channel conductor without magnetic correlation was outlined on the LJ claims. A sample taken from the gossan overlying the conductive zone contained 25 ppm Cu, 14 ppm Pb and 88 ppm Zn. A rock sample taken one half mile to the north contained trace amounts of base and precious metals.

One 2-channel and one 4-channel anomaly were outlined on the JA claims. They are attributed to pyrite-bearing gossans along a diabase dyke. The ground EM surveys outlined weak conductors. Seven trenches were dug into the most prominent gossans but

the grab samples taken contained only low to trace amounts of base and precious metals.

Geological mapping of the claims at one inch to 1,000 feet indicates that the intermediate metavolcanics are mostly andesitic and dacitic strongly carbonatized, finely laminated tuffs with some massive lavas. The tuffs commonly grade into calcareous sediments. Coarse breccias are also common, and thin lenses of graphitic shale frequently form interbeds marked by gossans. The felsic rocks include rhyolite and rhyodacite, breccias, agglomerates, finely laminated tuffs and massive lavas. The lavas are commonly porphyritic and quartz eyes are common in rhyolite breccia and tuff. The felsic intrusives consist of granite, quartz-monzonite and granodiorite. Prominent diabase dykes intrude all units except the granitic masses.

Gossans trending parallel to and commonly marking confirmed or suspected contacts within the more siliceous units of the volcanic pile result from weathering of concentrations of pyrite, or rarely, pyrrhotite. Disseminated pyrite forms two to five per cent of the rock. Massive pyrite veins are six to eight inches thick with some on the LJ property as much as five feet thick.

MS CLAIMS 76 M/7
Great Plains Development Company of Canada Ltd., 67°16'N, 110°52'W
715, 5th Avenue S.W.,
Calgary, Alberta, T2P 2X7

Rio Tinto Canadian Exploration Ltd.,
120, Adelaide Street W,
Toronto, Ontario, 15H 1W5

REFERENCES
Fraser (1964); Padgham *et al.*, (1974).

PROPERTY
MS 1-59

LOCATION
The property is one mile west of Ced Lake and about 45 miles south of Grays Bay, (Figs. V-8, V-9).

HISTORY
This area, once part of Kennarctic's James River Reservation, was surveyed with airborne EM and magnetometer systems and geologically mapped from 1955 to 1957. After the Reservation was relinquished, Pan American Ventures in 1957, Harrons Development Ltd. in 1967 and Polar Star Mines in 1969, mapped, trenched and did ground geophysics in the area. The MS claims were staked in November, 1974.

DESCRIPTION
The property is underlain by part of the Archean High Lake greenstone belt. A sedimentary unit strikes north-northeasterly through the eastern part of the claim group, between intermediate volcanics to the east and felsic volcanics to the west. These rocks have undergone greenschist facies metamorphism. There are numerous gossans in the area.

CURRENT WORK AND RESULTS
The MS claims cover part of the area surveyed with EM and magnetometer systems by Questor in June, 1975. Fifteen four- to six-channel anomalies and eight two- to three-channel anomalies were outlined. Thirteen conductors have magnetic correlation. Horizontal-loop geophysics, geochemical rock and soil sampling and geological mapping at 1 inch to 1,000 feet tested the anomalies on the ground.

Outcrops within the claims are mainly rhyolitic tuffs with thinly interbedded dacitic tuffs. They are overlain by a narrow black shale unit, containing up to 20% pyrite and minor magnetite, which grades into calcareous and graphitic volcaniclastic sediments. Mafic volcanics outcrop at one place on the claims.

The EM anomalies correspond to pyrite concentrations in cherty felsic tuffs and the pyritic shales. Rock and soil samples of the gossans contain as much as 94 ppm Cu, 12 ppm Pb and 98 ppm Zn.

DC, FM, SM CLAIMS 76 M/7
Noranda Exploration Company Ltd., 67°22'N, 110°47'W
Box 1619,
Yellowknife, N.W.T.

REFERENCES
Fraser (1964); Padgham *et al.*, (1974).

PROPERTY
DC 1-79; FM 1-77, 80-91, 94-100, 109-113; SM 1-64.

LOCATION
These claims lie along the Kennarctic River about 30 miles south of Grays Bay (Figs. V-8, V-9). The FM claims are to the north of and contiguous with the DC claims. The SM claims lie one half mile southwest of the DC block.

HISTORY
Kennco's James River Reservation, which was relinquished in late 1957, included NTS 76 M/7. Great Plains Development Company staked the DC, FM and SM claims in December, 1974 and Noranda optioned them in 1975.

DESCRIPTION
The claims cover metamorphosed Archean intermediate to felsic volcanic flows, pyroclastics and sediments of the High Lake greenstone belt. Granitic plutons and diabase dykes and sills intrude the northerly-trending supracrustals. Irregular pyritic zones with minor pyrrhotite occur in all lithologies; locally the sediments contain disseminated sphalerite.

CURRENT WORK AND RESULTS
Eighty line-miles of EM and magnetometer surveys were flown by Questor along lines 0.25 miles apart. Most of the 40 anomalies outlined were recorded on 2 or 3 channels and 16 have magnetic correlation. Ground surveys included 13,200 feet of horizontal shootback EM and 10,800 feet of magnetometer surveying and geological mapping at scales of one inch to one half mile and one inch to 400 feet.

The centre of the FM claims are underlain by carbonates, graphitic and pyritic shales and greywackes flanked to the west by interbedded intermediate and felsic volcanics and to the east by porphyritic rhyodacite flows. The DC claims are underlain by interbedded intermediate and felsic tuffs, greywacke and porphyritic rhyodacite to the south and southwest, and by rhyodacitic tuff and agglomerate to the north.

A quarter mile wide unit of graphitic sediments underlies the western claim boundary. The SM claims are underlain by rhyolite, intermediate tuffs and flows, and graphitic sediments. The rocks are chloritic and sericitic and contain carbonate and quartz veins or lenses. Granitic intrusives outcrop on the FM and DC claims.

The average pyrite content in the black shales is 5% but it ranges up to 30%. Chalcopyrite with secondary malachite and azurite occur in quartz veins, the tuff and agglomerate unit and the porphyritic rhyodacite. The geophysical anomalies were attributed to overburden effects, pyrite-phyrrhotite zones and the graphitic, pyritized shale beds. Rock chip samples of pyritic zones contained as much as 110 ppm Cu, 70 ppm Pb, 120 ppm Zn, 0.07 oz/ton Au and 0.013 oz/ton Ag.

Only a few of the 27 lake bottom sediment samples collected and analysed were anomalous. The maximum values were 280 ppm Cu, 1400 ppm Zn, 140 ppm Pb and 3.2 ppm Ag.

DOT, KING, RAT, TEL CLAIMS — 76 M/7
Cominco Ltd., — 67°27'N, 111°10'W
200, Granville Square,
Vancouver, B.C. V6C 2R2.

REFERENCES
Fraser (1964); Padgham *et al.*, (1974).

PROPERTY
DOT 1-8; KING 1-23; RAT 1-2; TEL 24-75.

LOCATION
The property lies 4 miles north of High Lake on the west shore of Kennarctic River (Figs. V-8, V-9).

HISTORY
The KING claims were staked in June, 1974, the DOT and RAT claims in September, 1974 and the TEL claims in December, 1974.

DESCRIPTION
The claims are underlain by Archean felsic to intermediate metavolcanics and sediments of the High Lake greenstone belt and by granitic intrusives. The felsic rocks include quartz-eye and cherty tuffs, calcareous rhyolite tuff and quartz-feldspar porphyry. The quartz-eye tuff contains scattered bands and pods of calcareous and dolomitic material. The intermediate rocks include andesitic breccia, lapilli tuff, calcareous andesitic tuff and flows with minor dolomite and calcite interbeds. The sedimentary unit is mainly greywacke and locally abundant, commonly graphitic, shales. A granitic intrusive underlies the western part of the KING group. A hybrid zone made up of rhyolite and cherty tuffs in a matrix of quartz eye feldspar porphyry occurs at the contact of the granite with the felsic volcanics to the north. Diabase dykes and sills cut all rocks. Sericitization and chloritization is common.

Gossans are developed over nearly massive pyrite containing minor chalcopyrite in the hybridized zone (Area B) and over narrow, erratic pods of chalcopyrite associated with the acid tuff sequence (Area A).

CURRENT WORK AND RESULTS
Ninety-seven gossan soil samples were collected from areas A and B. Analytical results ranged up to 150 ppm Cu, 32 ppm Pb and 57 ppm Zn for area A and 800 ppm Cu, 300 ppm Pb and 310 ppm Zn for area B.

Horizontal loop EM and magnetometer surveys along 4.4 line kilometers (3 line-miles) failed to outline any conductors in either of the mineralized areas.

FOG, KLC, SNOW CLAIMS — Copper, Lead, Zinc
Cominco Ltd., — 76 M/7
200, Granville Square, — 67°18'N, 110°55'W
Vancouver, B.C. V6C 2R2

REFERENCES
Fraser (1964); Padgham *et al.*, (1974).

PROPERTY
FOG 1-28; KLC 1-49; SNO 1-25

LOCATION
The property is three miles southwest of High Lake (Figs. V-8, V-9).

HISTORY
The KLC claims were staked in June, 1974, the FOG and SNO claims in September, 1974. Preliminary geological mapping was done in July and August, 1974.

DESCRIPTION
The claims are underlain by Archean acid to intermediate metavolcanics of the High Lake greenstone belt, intruded to the west by granitic bodies and locally by diorite. The intermediate volcanics include andesite tuffs and flows, calcareous andesite tuffs and quartz-porphyry andesite. The felsic units are rhyolite tuffs with some dioritic material and quartz-eye rhyolite tuff. There are lesser amounts of intermediate and acid lapilli tuffs and breccias. Most of the fine to medium grained components of the rocks have been sericitized and chloritized. A dolomitic carbonate unit with associated chert breccia and cherty tuff outcrops to the east of the claim area.

Numerous subparallel northerly-trending gossans cover layers and discontinuous lenses of massive and disseminated pyrite and pyrrhotite with minor chalcopyrite, galena and sphalerite in quartz-eye rhyolite, rhyolite and andesite tuffs, andesite lapilli tuffs, rhyolite breccia, chert, cherty and argillaceous tuffites and dolomites.

CURRENT WORK AND RESULTS
Every gossan on the claims was sampled; 155 soil samples and 170 grab and chip rock samples were assayed. Slightly anomalous metal contents were detected in soil samples from 76 gossans. Slightly anomalous base metal contents with less than 0.4 ppm Ag and no Au were detected in 112 rock samples.

Horizontal-loop ground EM and magnetic surveys on 75 line-kilometres (47 miles) distributed on ten grids tested favourable rocks and anomalies found by a Kenting airborne EM and magnetics survey done in 1975. Few of the conductors outlined coincident with the gossans were considered worthy of further attention.

DAI, EVE, NITE, RUSH CLAIMS
Cominco Ltd.,
200, Granville Square,
Vancouver, B.C. V6C 2R2

Copper, Zinc
76 M/6
67°26'N, 111°00'W

REFERENCES
Fraser (1964)

PROPERTY
DAI 1-10; EVE 1-100; NITE 1-12; RUSH 1-6.

LOCATION
The claims are three miles west of High Lake.

HISTORY
The DAI, NITE and RUSH claims were staked in September, 1974 and the EVE claims in January, 1975. Preliminary mapping was done in August, 1974.

DESCRIPTION
The property lies on the southeast branch of the Run Lake Belt (Figs. V-8, V-9) which locally consists mainly of northeast-trending, west-dipping intermediate tuffs and andesite flows. Granitic intrusions completely surround the property but seldom outcrop within it. Two main gossans are associated with rhyolite pyroclastics: the Nite gossan on NITE 1, 2 and the Rush gossan on RUSH 1-4, 8, DAI 5 and EVE 98. The Nite gossan covers narrow intercalations and lenses of quartz eye rhyolite and quartz eye rhyodacite in andesite flows, lapilli tuffs, and tuff breccias which are intruded by a diorite dyke. Quartz-sericite and chlorite alterations are intensely developed in the rocks under the gossan. Nine distinct layers of massive and thinly-layered pyrite with minor chalcopyrite and sphalerite are present. Sphalerite occurs mainly in the siliceous beds; chalcopyrite in the more chloritic.

The Rush gossan has formed on a sequence of rocks similar to those at the Nite gossan with, in addition, rhyolite tuff, muddy andesite tuff and lapilli tuff, dolomite and dykes of quartz-eye rhyolite and dacite. Alteration includes pervasive chloritization, pyritization, silicification, sericitization and locally, cordierite-anthophyllite alteration. The gossans extend randomly across all rock units but the most intense mineralization is spatially related to the acid breccia and lapilli tuff units. Pyrite, the most abundant sulphide, is accompanied by chalcopyrite, sphalerite and traces of galena, in alteration zones similar to those at the Nite gossan.

CURRENT WORK AND RESULTS
The anomalies and showings detected by prospecting or by the 1975 EM and magnetometer surveys flown by Kenting Earth Sciences Ltd. were investigated by geological, geochemical and geophysical surveys. The property was mapped at a scale of one inch to one mile, and the two gossans were mapped at a scale of 1:2,000. Assays of 14 soil and 7 rock samples collected during the mapping showed anomalous base metal concentrations in areas of known showings, but no anomalous precious metals values.

RUN LAKE PROJECT
(AMI, FAST, NORSE, RUN, XVM CLAIMS)
Cominco Ltd.,
200, Granville Square,
Vancouver, B.C. V6C 2R2

Copper, Silver
76 M/11
67°35' - 67°42'N
111°00' - 111°15'W

REFERENCES
Fraser (1964)

PROPERTY
AMI 1; FAST 1-192; NORSE 1-33, 36-43; RUN 1-18; XVM 1-25.

LOCATION
The claims are 15 miles south of Grays Bay on the east shore of the Anialik River (Figs. V-8, V-9).

HISTORY
The AMI, RUN and XVM claims were staked in 1974, the FAST and the NORSE claims in 1975.

DESCRIPTION
The claims cover part of the Run Lake belt of acid to intermediate volcanics with interbedded calcareous and argillaceous units. Dense, featureless acid tuffs, commonly with minor mafic laminations and quartz eyes, predominate but there are cherty acid tuffites and andesitic flows and tuffs. Chloritic and sericitic alteration is widespread. Gossans have formed on disseminated chalcopyrite, pyrrhotite and pyrite and stringers and pods of sulphides in altered acid tuffs. Hematite and magnetite are present locally.

CURRENT WORK AND RESULTS
Ground geophysical surveys, 68 line kilometers on 8 grids, covered interesting gossans or anomalies detected during Kenting's EM and magnetometer survey. Grids on mineralized outcrops were tested with horizontal-loop and VLF EM, magnetometer, IP and gravity surveys. Targets identified only with airborne anomalies were tested with EM and magnetics. No EM, magnetic or gravity anomalies directly related to economic sulphide concentrations were outlined.

Eight holes totalling 610.3 metres (2,001 feet) drilled on RUN 2, 8 and 9 intersected as much as 3.85% Cu and 1.6 oz/ton Ag. across 1.4 metres.

BLEW CLAIMS
Kennarctic Explorations Ltd.,
Suite 730,
505, Burrard Street,
Vancouver, B.C.

Copper, Zinc, Lead,
Silver, Gold
76 M/11
67°37'N, 111°03'W

REFERENCES
Fraser (1964)

PROPERTY
BLEW 1-40; 42-51.

LOCATION
The property is 10 miles south of Grays Bay (Figs. V-8, V-9).

HISTORY
BLEW 1-40 were recorded in 1974, BLEW 42-51 in 1975.

DESCRIPTION

The claims are underlain by complexly folded intermediate to felsic volcanics of the Run Lake greenstone belt. Massive flow-banded rhyolite, quartz porphyry rhyolite and welded tuff with intercalated intermediate volcanics are overlain by massive, fine to coarse-grained andesite cut by four inch to four foot wide subparallel seams made up of 70% carbonate and 30% fine volcanic fragments. Bombs as much as six inches in diameter and rough subangular pillow-like structures with carbonate selvages are present in the carbonate unit and black graphitic shale, quartz porphyry dykes, biotite granite and diabase dykes are represented on the claims.

At the contact between the felsic and intermediate volcanics there is a massive sulphide impregnation as much as 200 feet thick, which gives rise to numerous gossans. The sulphides are locally fresh on the surface, but are usually strongly leached and weathered to limonite soil and porous silica - pyrite sinter. Pyrite and pyrrhotite are the most abundant sulphides with very little chalcopyrite, except in small isolated concentrations. Minor chalcopyrite also occurs with pyrite in the shale as disseminations and stringers and with pyrrhotite as disseminations and on carbonate-filled fractures in andesite. Two quartz veins contain chalcopyrite, pyrite, silver and gold.

CURRENT WORK AND RESULTS

In 1975 the BLEW claims were explored by geological, geophysical and geochemical surveys and some diamond drilling. Thirteen conductors were outlined by 28 line-miles of horizontal loop EM and magnetic surveys on lines 400 feet apart. Most were coincident with gossans and magnetic and geochemical anomalies.

Analysis of 1,074 samples of glacial till and gossans showed the latter to be anomalous in both base and precious metal values, but the till to be little above background.

Three diamond drill holes totalling 605 feet on claims 18, 20 and 8 intersected pyrite and pyrrhotite which contained only a few anomalous metal values.

BEER CLAIMS 86 P/1
Kennco Explorations (Canada) Ltd., 67°02'N, 112°04'W
Suite 730,
505, Burrard Street,
Vancouver, B.C.

REFERENCES

Craig *et al.*, (1960); Fraser (1964)

PROPERTY

BEER 1-85

LOCATION

The claims lie 35 miles southeasterly of Kikerk Lake and about 40 miles northeasterly of Takijuq Lake.

HISTORY

BEER 1-50 were staked in 1974 and BEER 51-85 in 1975.

DESCRIPTION

The claims lie on the Run Lake Belt, a western offshoot of the High Lake Greenstone Belt that extends from Grey's Bay to Takiyuk Lake (Figs. V-8, V-9). Gneisses of mixed origin interrupt the continuity of the belt and there are minor offsets on faults.

CURRENT WORK

Geological, EM and magnetometer surveys were done on the claims in 1975.

HAWK LAKE - BLUE LAKE PROJECT 86 I/8, 9
Noranda Exploration Company Ltd., 66°31'N, 112°19'W
P.O. Box 1619,
Yellowknife, N.W.T.

REFERENCES

Craig *et al.*, (1960)

PROPERTY

The property comprises six separate blocks of claims which are listed in Figure V-10.

LOCATION

The claims lie ten miles east of the north part of Takijuq Lake along the Hawk Lake Blue Lake supracrustal Belt (Figs. V-8, V-10). Block F lies north of the Hood River.

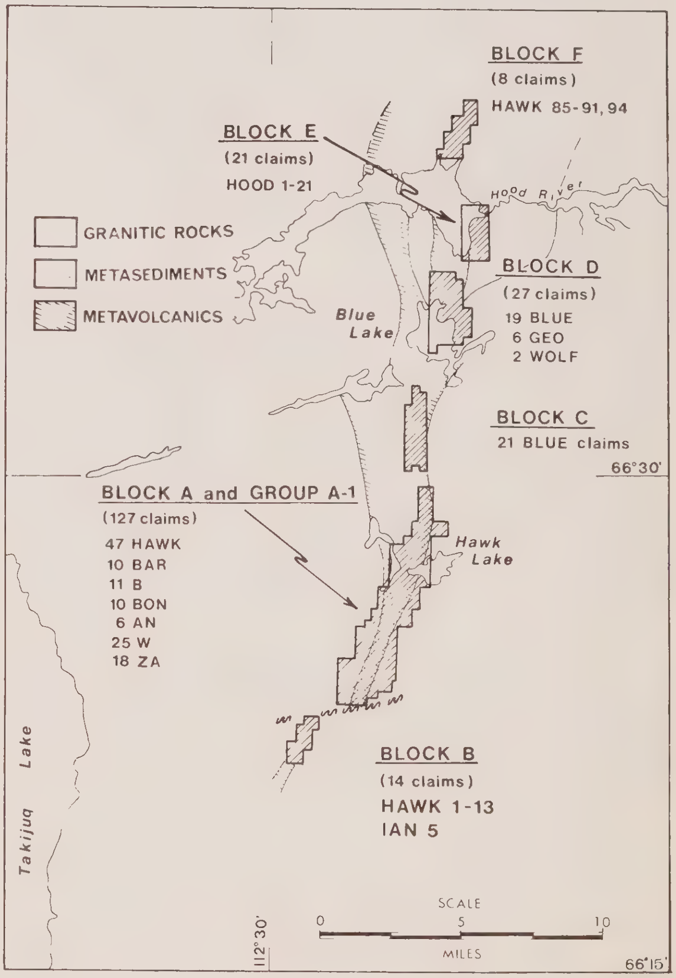


Figure V-10: Hawk Lake supracrustal belt showing claim blocks explored by Noranda Exploration Company Ltd.

HISTORY

In 1957 several claims were staked at Blue Lake for Pan American Ventures Company Ltd. but no work was recorded and the claims lapsed. The Blue Lake gossan was briefly examined by Eldorado Mining and Refining Limited in 1960.

Claims covering the same ground as those described in this summary were optioned by Ballindery Explorations Ltd. and Cadillac Explorations Ltd. from C. Vaydik in 1970. An EM magnetic and spectrometer survey was flown, the geology mapped at one inch to one half mile and three short X-ray holes were drilled in the Blue Lake area.

Noranda Exploration Company Limited optioned the property in the fall of 1974 from C. Vaydik; the numerous claims were staked for Noranda adjacent to the Vaydik holdings under the option agreement.

DESCRIPTION

A belt of mafic and intermediate flows and tuffs averaging two miles in width form the western part of the supracrustal belt. A half-mile wide sequence of felsic tuffs and quartz-eye sericite schist extends along the northwest margin of Block C and terminates against a fault north of the claims. A similar felsic sequence outcrops on an island in Blue Lake.

South of Blue Lake, the eastern part of the belt consists of interbedded volcanics and sediments, as much as 1,000 feet wide, which grade into tuffs. North of the lake, a 2.5 mile sequence of sedimentary rocks forms the eastern part of the belt.

Pegmatite dykes cut the volcanic and sedimentary rocks near Hawk Lake on Block A. Northwesterly striking diabase dykes intrude the granitic and supracrustal rocks.

Long gossans have developed from massive to disseminated pyrite and pyrrhotite with minor chalcopyrite at the contacts between flows and tuffs, flows and sediments, and tuff and sediment beds.

Contact metamorphic aureoles around the intrusive granites overprint the regional greenschist facies metamorphism. The grade of metamorphism increases southward as the belt of supracrustal rocks narrows to less than a mile. Shale and siltstone are metamorphosed to biotite sillimanite gneiss at the granite contacts.

The dominant structural features are isoclinal folds with steeply plunging axes. Cleavage parallel to bedding dips steeply to east or west. Northeast, northwest and northerly striking faults have been mapped. Several of these intersect in the Blue Lake area, and a northeast striking lineament passes through Hawk Lake.

CURRENT WORK

Block A

Five grids in the northern part of the block and one in the southern part were mapped. Magnetometer and EM surveys on three of the northern grids and on the southern grid detected conductors with magnetic correlation. Soil samples taken over thirteen grids in Block A and five grids within two miles of the western boundary of the block, were analyzed for copper, lead, zinc and silver. Anomalous values were reported from two grids north of Hawk Lake.

Diamond drilling of one 332-foot hole on a grid southwest of Hawk Lake, intersected amphibolite containing pyrrhotite, pyrite and minor chalcopyrite.

Block B

The geology of a grid in the southern part of the block was mapped at one inch to 400 feet. Samples from the gossan on this grid did not contain anomalous metal values.

Block C

A small grid on the eastern side of the block was mapped at one inch to 200 feet. Copper, lead, zinc and silver analyses of soils from three grids in the northern half of Block C and from a grid east of its south end indicated gossans in this area containing high metal values.

Block D Area

Two grids on Block D and two between it and Block E were mapped at various scales. The copper, lead, zinc and silver content of soil samples outlined anomalies on three of the twelve grids surveyed. Five of the grids were within one mile of Block D.

Block E

Soil samples from a grid across the contact of the volcanics with sediments outlined anomalies. Gossans on this grid cover pyrrhotite, pyrite and minor chalcopyrite in a siliceous unit within mafic volcanics.

Block F Area

Geochemical anomalies were not indicated by soil samples from a grid underlain by metavolcanics.

BO CLAIMS | 86 I/1
Texasgulf Inc., | 66°05'N, 112°09'W
Box 175,
5000 Commerce Court West,
Toronto, Ontario M5L 1E7

REFERENCES

Hyde *et al.*, (1976)

PROPERTY

BO 1-13

LOCATION

The claims are 10 miles east of the southern end of Takijuq Lake.

HISTORY

BO 1-13, on the eastern edge of Prospecting Permit 296, were staked over an EM anomaly detected during a survey flown in 1973.

DESCRIPTION

The claims are underlain by metavolcanics, of the Takijuq South Segment (Fig. V-8).

CURRENT WORK

Holes 250 feet apart were drilled in dacitic tuff on the southern part of BO 6. One was 204 feet long and inclined northeast, the other was 239 feet long and inclined northwest. One hole intersected three feet of tuff containing 5% disseminated pyrite and pyrrhotite.

PROSPECTING PERMIT 296
Texasgulf Inc.,
Box 175,
5000 Commerce Court West,
Toronto, Ontario M5L 1E7

Silver, Zinc, Copper
86 I/2

REFERENCES
Gibbins *et al.*, (1977); Hyde *et al.*, (1976)

PROPERTY
Prospecting Permit 296.

LOCATION
The permit area is 255 miles northerly of Yellowknife and east of the southern end of Takijuq Lake (Fig. V-8). Grid and anomaly locations and coordinates of mineral zones are tabulated below.

Coordinates of Anomalies and Grids on Texasgulf's Prospecting Permit 296

Grid	Area/ Anomaly	Latitude	Longitude
R	41	66°02'05"	112°42'30"
A	10 (No. 10 zone)	66°03'35"	112°45'15"
C (West Extension)	461 (Showing)	66°04'10"	112°46'50"
C (West Extension)	462	66°03'45"	112°48'20"
C (West Extension)	463	66°03'45"	112°46'20"
I	3	66°04'50"	112°49'30"
	20	66°06'30"	112°46'30"
U	36	66°05'55"	112°30'30"
Shetland Lk.		66°04'	112°48'
No. 46 Zone		66°04'00"	112°45'30"
N	38	66°03'30"	112°50'30"
E	29	66°05'30"	113°42'30"

HISTORY
Prospecting Permit 296 was granted in 1973 to Ecstall Mining Ltd., a wholly owned subsidiary of Texasgulf Inc. Reconnaissance mapping and an airborne EM and magnetometer survey was followed by detailed geological, geophysical and geochemical surveys in 1973 and 1974 and by diamond drilling in 1974, on the A grid and the C grid west extension. Impressive intersections of copper-zinc sulphides with minor silver and lead were reported from the A grid (Gibbins *et al.*, 1977) on the Number 10 zone and on the 461 showing.

DESCRIPTION
The southern part of 86 I/2 is underlain dominantly by volcanics, the northern part by granitic rocks. A felsic volcanic pile underlies a one- by five-mile area and is flanked by intermediate to mafic volcanics. The A grid massive sulphides are in the south-central part of this felsic pile. The volcanics trend northeasterly, near Takijug Lake, and easterly at the eastern edge of the permit area (Hyde *et al.*, 1976).

CURRENT WORK
A revised one inch to 1,320 feet compilation of regional mapping covering the southern part of the permit area and part of adjoining 86 I/1 was prepared. The geology of approximately 2.5 square miles south of Shetland Lake was mapped at one inch to 200 feet.

Horizontal-loop and VLF EM and magnetometer surveys covered the 462 copper-zinc showings.

Soil samples collected over areas 3, 10, 20, 36 and Grid C (west extension) were analyzed for copper, lead, zinc and silver.

The No. 10 zone on the A grid was tested by 16 drill holes totalling 7,641 feet and 500,000 tons of massive sulphide grading 5% Cu, 3.5% Zn and 1 oz/ton Ag and 150,000 tons of 4% Zn and less than 1% Cu were outlined. Eleven holes, totalling 3,474 feet drilled on the Anomaly 41 grid, 2.5 miles southeasterly of the A grid, outlined a massive sulphide lens containing 320,000 tons of 1.57% Cu, 0.2% Pb, 4.12% Zn and 0.52 oz/ton Ag. The sulphides occur in dacite near a granite contact.

Two holes, 1,298 feet of drilling, tested geochemical and geophysical anomalies in felsic volcanics on the Number 46 zone. One hole intersected 5 feet of stringer sulphides.

A 302-foot hole tested Anomaly 29 and 456-foot hole tested Anomaly 38. A second hole on Anomaly 29 was abandoned at 50 feet. These conductors are apparently caused by pyrite, pyrrhotite and graphite.

BB CLAIMS
Cominco Ltd.,
200 Granville Square,
Vancouver, B.C. V6C 2R2

Zinc
86 H/2
65°14'N, 112°57'W

REFERENCES
Bostock (1967, 1976); Henderson (1975a); Henderson and Easton (1977).

PROPERTY
BB 1-25

LOCATION
The claims lie on the south shore of Point Lake, 195 miles north-northeast of Yellowknife (Fig. V-11).

HISTORY
The BB claims were staked for Cominco Ltd. in 1974 adjoining and east of the MM claims which had been staked for Precambrian Shield Resources a few months earlier.

DESCRIPTION
The area is underlain by Archean Yellowknife Supergroup massive and pillowed mafic flows, mafic tuffs, conglomerate and interbedded greywacke and mudstone intruded by gabbro dykes and granitic rocks. Cherty iron formation lies along the contact of the volcanics with the greywackes. Mafic tuff contains both conformable and cross cutting sulphide-bearing carbonate lenses.

CURRENT WORK AND RESULTS
The property was mapped at one inch to one half mile. Samples of the gossans contain as much as 0.24% Zn and the iron formation contains above-background quantities of zinc, silver and copper.

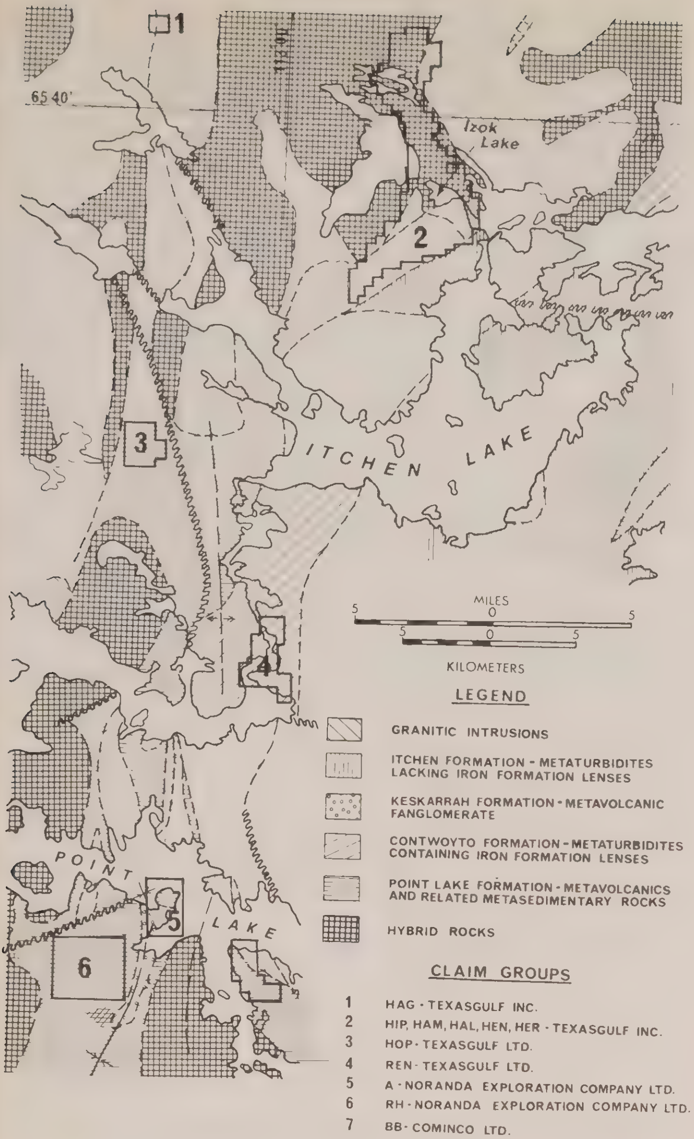


Figure V-11: Location of Properties worked on in the Itchen-Point Lakes area in 1975. Geology simplified after Bostock, 1976.

RH CLAIMS
Noranda Exploration Company Ltd.,
Box 1619,
Yellowknife, N.W.T., XOE 1HO

Copper
86 H/3
65°13'N, 113°11'W

REFERENCES
Bostock (1976); Henderson (1975, 1977); Henderson and Easton (1977).

PROPERTY
RH 4-13, 20-24, 27

LOCATION
The RH claims are one mile south of Point Lake, and 200 miles north-northeast of Yellowknife (Fig. V-11).

HISTORY
In 1963 the area was staked as the CUP claims by Point Prospecting Syndicate. Detailed geological mapping, trenching and sampling in 1964 was followed by geological mapping and prospecting in 1967 by Nahanni Mines Ltd.

The RH claims were staked for Noranda Exploration Company Limited in 1974.

DESCRIPTION
Massive and pillowed mafic volcanics, mafic tuffs, interbedded greywacke and slate and conglomerate of the Yellowknife Supergroup intruded by metagabbro underlie the area. The RH claims cover gossans in metabasalt and metagabbro.

CURRENT WORK AND RESULTS
Ground EM and magnetic surveys, geological mapping at a scale of one inch to 200 feet and geochemical surveys explored a 1,200-foot long 5- to 10-foot wide gossan. Geochemical samples were analysed for copper, lead, zinc and silver. The gossan has been formed on massive, semi-massive and disseminated pyrite, pyrrhotite and minor chalcopyrite in a siliceous and graphitic matrix.

A CLAIMS
Noranda Exploration Company Ltd.,
P.O. Box 1619,
Yellowknife, N.W.T., XOE 1HO

Zinc, Copper, Silver
86 H/3, 6
65°16'N, 113°05'W

REFERENCES
Bostock (1976); Henderson (1975a); Henderson and Easton (1977).

PROPERTY
A 1-36

LOCATION
The property lies on the south shore of Point Lake, approximately 200 miles north of Yellowknife (Fig. V-11).

HISTORY
The A claims were staked in 1974 for Noranda Exploration Company Limited.

DESCRIPTION
Archean Yellowknife Supergroup massive and pillowed mafic flows, mafic tuffs, conglomerate, sandstone and interbedded greywacke and mudstone, intruded by gabbro underly the area. Mafic tuffs mineralized with pyrite, pyrrhotite and minor chalcopyrite are capped by gossans. The A claims cover a 20-foot long 3-foot wide zone of banded sphalerite, chalcopyrite and pyrrhotite in mafic tuffs.

CURRENT WORK AND RESULTS
Ground EM and magnetic surveys outlined three weak conductors with limited depth extent. Two diamond drill holes, totalling 635 feet, on EM conductors along strike from the showing intersected disseminated to massive pyrite, pyrrhotite and minor chalcopyrite. A third 200-foot hole drilled under the showing intersected a five-foot band of nearly massive sulphides assaying 0.02 oz/ton Au, 1.05 oz/ton Ag, 1.6% Cu, 0.2% Pb and 4.8% Zn.

HOP CLAIMS
Texasgulf Inc.,
P.O. Box 175,
5000, Commerce Court West,
Toronto, Ontario M5L 1E7

Copper, Nickel
86 H/10
65°30'N, 113°10'W

REFERENCES
Bostock (1967, 1976).

PROPERTY
HOP 1-41

LOCATION
The claims lie west of Itchen Lake (3 Fig. V-11) approximately 220 miles north of Yellowknife.

HISTORY
The HOP claims were staked in 1974 for Texasgulf Inc.

DESCRIPTION
The area is mostly underlain by metavolcanic and related metasedimentary rocks of the Point Lake Formation (Bostock, 1976).

CURRENT WORK AND RESULTS
Two holes totalling 805 feet tested gabbro bodies in granodiorite on HOP 1 and 2. Disseminated sulphides in the gabbro contain as much as 0.02% Cu and 0.06% Ni over 6.4 feet. A third, 343-foot drill hole on HOP 20 intersected andesite and graphitic mafic tuff containing disseminated pyrite and pyrrhotite and as much as 0.16% Zn and 0.24 oz/ton Ag. over 4.5 feet.

ITCHEN LAKE PROJECT
Texasgulf Inc.,
P.O. Box 175,
5000, Commerce Court West,
Toronto, Ontario M5L 1E7

Zinc, Copper,
Silver, Lead
86 H/6, 7, 10, 11, 14

REFERENCES
Bostock (1967, 1976); Craig (1960); Henderson and Easton (1977); Money and Heslop (1976).

PROPERTY
Four Texasgulf properties with a total of 1,199 claims are shown in Fig. V-11.

HISTORY
Texasgulf began exploring volcanic belts in the Slave Structural Province in 1971 and in late 1972 found a sulphide deposit near Takijuq Lake approximately 30 miles north of Itchen Lake (Fig. V-8). Continued work found a gossan at Izok Lake (Fig. V-11) containing 5% to 10% sulphides and 2% Zn and 2% Cu. In 1974, boulders of massive sulphides containing as much as 30% Zn and appreciable amounts of lead, copper and silver were found on the shores of Izok Lake and 280 REN, HAL, HAM, HEN, HER, HIP and HOP claims were staked to cover the source of these boulders. Four HAG claims were staked to the northwest. Another 915 claims were staked in 1975 on the southern extension of the volcanic belt and on geophysical conductors outlined by an airborne survey.

DESCRIPTION
The western half of Itchen Lake is underlain by a south-plunging anticline core and by quartz-monzonite, granodiorite, diorite-agmatite and mafic metavolcanics. To the east, south and west lie mafic to felsic flows, tuffs and gneisses of the Point Lake Formation of the Yellowknife Supergroup. In the central part of Itchen Lake, the volcanics are overlain by nodular quartz plagioclase biotite schists and gneiss and greywacke of the Contwoyto and Itchen Formations, Yellowknife Supergroup (Bostock, 1976).

CURRENT WORK AND RESULTS
In 1975, Texasgulf Inc. explored the Itchen Lake area with airborne and ground geophysical surveys, soil geochemical surveys, geological mapping and diamond drilling.

Three zones of massive sulphides, were intersected in drilling on the HEN and HER claims, near Izok Lake. Published reserves at Izok Lake as of January, 1978 are 12.15 million tons grading 2.83% copper, 1.43% lead, 13.7% zinc and 2.05 oz per ton silver. The Central and Northern Zones are located mainly in northeasterly trending synclinal folds beneath Izok Lake. Part of the central zone underlies a small island. The central sulphide zone attains 300 feet in thickness and pinches out at depth to the south. Quartz-feldspar-muscovite-biotite gneisses derived from felsic flows and tuffs and minor mafic gneisses derived from andesite flows and tuffs enclose the deposit. Chlorite-biotite-cordierite gneiss in close association with, and beneath, the sulphides for 200 feet may represent a volcanic cone or ridge which emitted metal-bearing solutions. The mineralogy of this rock probably results from magnesium enrichment.

The major sulphide minerals are sphalerite, chalcopyrite, pyrite and pyrrhotite with minor amounts of galena, tetrahedrite and a silver sulphosalt, possibly polybasite. Alternating pyrite- and sphalerite-rich layers are present locally but most of the sulphides are a uniform aggregate (Money and Heslop, 1976).

The following work has been submitted for assessment credit:

HAG claims: 184 samples were collected along 1.77 line-miles over two parallel gossans.

HAL claims: a 297-foot hole drilled on HAL 1 intersected 108 feet of quartz feldspar cordierite biotite rock containing disseminated to massive pyrite-pyrrhotite with minor sphalerite. A second hole on HAL 2 failed to reach bedrock.

HAM claims: a 346-foot hole on HAM 4 intersected 38.7 feet of granitized rhyolite, which assayed as much as 1.56% Zn over 4.2 feet. A 307-foot hole on HAM 3 intersected minor stringers and disseminations of chalcopyrite.

HEN claims: 2,597 soil samples were collected along 24.5 line-miles.

HIP claims: a 5,500-foot long EM conductor was surveyed using ground EM and magnetometer.

REN CLAIMS
Texasgulf Inc.,
P.O. Box 175,
5000, Commerce Court West,
Toronto, Ontario M5L 1E7

Gold
86 H/6, 7
65°25'N, 113°00'W

REFERENCES
Bostock (1967, 1976).

PROPERTY
REN 1-35

LOCATION
The claims lie between Itchen and Point Lakes (Fig. V-11) 215 miles north of Yellowknife.

HISTORY
The REN claims were staked in 1975 for Texasgulf Inc.

DESCRIPTION
The country rocks are metaturbidites of the Contwoyto Formation containing iron formation lenses (Bostock, 1976).

CURRENT WORK AND RESULTS
About 1,200 soil samples were collected along 11.65 line-miles of grid covering three subparallel conductors detected by an airborne EM survey.

TA CLAIMS
Texasgulf Inc.,
Box 175,
5000, Commerce Court West,
Toronto, Ontario M5L 1E7

86 H/15
65°57'N, 112°47'W

REFERENCES
Allan *et al.*, (1973); Bau *et al.*, (1978); Bostock (1967, 1976); Craig (1960); Craig *et al.*, (1960); Gibbins *et al.*, (1977).

PROPERTY
TA 1-6

LOCATION
The claims are seven miles west of Rockinghorse Lake and 30 miles north of Itchen Lake.

HISTORY
TA 1-4 were staked in August, 1973 for Ecstall Mining Ltd., a subsidiary of Texasgulf Inc. TA 5 and 6 were added in July, 1974. EM and magnetometer surveys of the property in 1974 outlined two weak to moderate conductors.

DESCRIPTION
Diorite and granodiorite with minor medium-grained amphibolite and banded amphibolite underlie the TA claims and are in contact to the northeast with mafic flows of the Point Lake Formation, Yellowknife Supergroup (Bostock, 1976).

CURRENT WORK AND RESULTS
Eighty soil samples were collected on the TA claims in 1975.

WESTERN SLAVE PROVINCE

Only two base metal exploration projects are reported from the Western Slave Province (Fig. V-3), which is better known for its gold prospects.

VICE CLAIMS
Noranda Exploration Company Ltd.,
P.O. Box 1619,
Yellowknife, N.W.T., XOE 1HO

Copper
86 B/3
64°06'N, 115°09'W

REFERENCES
Frith *et al.*, (1974); Lord (1942); Tremblay (1948); Tremblay *et al.*, (1954); Wilson and Lord (1942).

PROPERTY
VICE 1-11

LOCATION
The property lies east of Diabase Lake and west of Ranji Lake, 120 miles northwest of Yellowknife.

HISTORY
Gold was discovered near the western part of Indin Lake in 1938. In 1970 an EM and magnetic survey was flown over the area for Freeport Oil Company Alberta Ltd. The VICE claims were staked in 1975 for Noranda Exploration Company Limited.

DESCRIPTION
VICE 1-11, on the southern end of a north-trending Archean greenstone belt are underlain by knotted schists, gneisses, greywackes, mudstones, rhyolites and rhyodacites of the Yellowknife Supergroup. The rocks dip steeply east and are intruded by gabbro and diabase. A major northwest striking fault separates the metasedimentary rocks from the volcanics. There are disseminations and blebs of chalcopyrite and pyrrhotite in medium-grained diabase and a 75-foot wide, 200-foot long gossan has formed on disseminated to massive pyrite and pyrrhotite at the contact of the volcanics and sediments.

CURRENT WORK AND RESULTS
The claims were mapped at one inch to 400 feet and surveyed with EM and magnetometer. Grab samples of diabase containing chalcopyrite and pyrrhotite assayed 5% Cu but the showing does not have significant lateral extent. The geophysical survey outlined a strong 800-foot long 50-foot wide conductor and a weak conductor coincident with an area of moderately high magnetic response.

Z CLAIMS
Cominco Ltd.,
200, Granville Square,
Vancouver, B.C. V6C 2R2

86 B/6
64°23'N, 115°21'W

REFERENCES
Frith *et al.*, (1974); Lord (1942); Nickerson (1972); Wilson and Lord (1942).

PROPERTY
Z 1-34

LOCATION
The property lies immediately southwest of Sleeping Kitten Lake, 138 miles north-northwest of Yellowknife.

HISTORY
Z 1-34 were staked by Cominco Ltd. in 1975 to cover the possible source of lake sediment and anomalies reported in 1972 (Nickerson, 1972) and confirmed in 1974.

DESCRIPTION
Yellowknife Supergroup, nodular schists, gneisses and granite intrusives underlie the claims. The northwest striking Inca fault transects the southwest corner of the property.

CURRENT WORK AND RESULTS
Over 250 soil samples were collected from the B_1 soil horizon to determine the source of the lake sediment anomalies but no significant soil anomalies were found.

SOUTHERN SLAVE PROVINCE

Only three base metal projects are reported from Southern Slave Province. The following references are to one inch to four mile geological maps:

Brown (1950b); Folinsbee (1949); Fraser (1969); Henderson and Jolliffe (1937): Moore *et al.*, (1951).

More recent mapping compiled by Henderson (1976) covers NTS 85 I and 85 J. References of more local or specific type are included with individual project reports.

DS, J, LS, RICE, SJS, T CLAIMS — 75 M/2
Great Plains Development Corporation of Canada Ltd., — 63°02' - 63°14'N, 110°53' - 110°55'W
715 5th Avenue S.W.,
Calgary, Alberta T2P 2X7

Rio Tinto Canadian Exploration Ltd.,
120, Adelaide Street W,
Toronto, Ontario.

REFERENCES
Heywood and Davidson (1969)

PROPERTY
DS 3-8; J 7, 10-26; LS 9, 10; RICE 1-2; SJS 1-5, 9-13; T 16-28.

LOCATION
The 12 claim groups are 120 miles east-northeast of Yellowknife and 14 miles north of McLeod Bay on Great Slave Lake (Fig. V-3).

HISTORY
The claims were staked in early 1975 for Great Plains Development Company of Canada Ltd. and are 50% owned by Rio Tinto Canadian Exploration Ltd.

DESCRIPTION
The claim groups cover geophysical anomalies in a series of felsic to mafic volcanics and sediments that form part of the Indian Mountain Lake greenstone belt (Heywood and Davidson, 1969).

CURRENT WORK AND RESULTS
Magnetic and horizontal loop EM surveys using a 200-foot coil separation over selected areas of the claims outlined several significant anomalies.

A CLAIMS — 85 I/10, 85 I/15
Worldwide Truck & Equipment Ltd., — 68°43'N, 118°38'W
1676 - 128 Street,
Ocean Park, B.C. B4A 3V3

REFERENCES
Henderson (1976); Lambert (1974).

PROPERTY
A 1-12

LOCATION AND ACCESS
The claims are 65 miles northeast of Yellowknife, on the southeast shore of Rex Lake and northwest of a small unnamed lake immediately north of Turnback Lake (Fig. V-3).

HISTORY
The A claims cover part of the north end of an intermittently mineralized zone that extends 8 miles southeasterly. The first claims staked on the zone in 1937 by the Aerial Exploration Syndicate were optioned the following year to Westfield Mining Ltd. who drilled 5 X-ray holes and 14 larger diameter holes on claims XL 1 and 2 which adjoin A 9 to the southwest.

Between 1938 and 1951 no assessment work was recorded and all except 5 claims in the Turnback Lake area lapsed. In 1951 Consolidated Mining and Smelting Ltd. staked over 50 claims in the area, surrounding the remaining claims and covering the lapsed ground. The area now covered by claims A 1-8 was partly included in that staking, and hence covered by the one inch to 400 foot scale geological mapping, magnetometer surveys and gossan prospecting done in the early 1950's. Cominco retains an 80% interest in claims XL 1 and 2.

The ground on which the A claims are located was dropped by Cominco Ltd. and the LUK claims were staked by the Yellowknife Syndicate in 1970, but these also lapsed and the land was restaked as the A claims in September, 1973 and subsequently transferred to Worldwide Truck and Equipment Ltd.

DESCRIPTION
The claims are underlain by northwest trending supracrustal rocks of the Yellowknife Supergroup. Basalts, andesites and rhyolites of the Cameron River Volcanics, and the slates and carbonates of the overlying sedimentary succession are intruded by granitic plutons.

Several small discontinuous gossans have formed at the contact of the granite with the metasediments.

CURRENT WORK AND RESULTS
Several gossans were prospected and sampled and the claims were surveyed with a Ronka EM-16.

ANN CLAIMS — 85 J/9
J.D. Mason, — 63°34'N, 114°23'W
Vancouver, B.C.

REFERENCES
Henderson (1976); Jackson and Nichol (1974).

PROPERTY
ANN 1-11

LOCATION

The property is immediately south of Ryan Lakes, 6 miles north of Yellowknife.

HISTORY

ANN 1-10 were staked in 1971 and partly restaked in 1973 by D. Nickerson. ANN 11 was staked in 1974 by R. Tees.

DESCRIPTION

The claims are underlain by pillowed and massive volcanics of the Kam Formation of the Yellowknife Supergroup. On the northwest of the claim block, the volcanics have been intruded by granodiorite.

CURRENT WORK AND RESULTS

During the winter lake bottom sediment was taken from the centres of lakes and ponds adjacent to and in the area covered by the claims. Samples were oven dried, sieved and the 80 mesh fraction analysed for zinc, arsenic and manganese. A zinc and an arsenic anomaly were outlined.

Gold Exploration

Three gold properties were explored in the southern Slave Province in 1975 and four properties, three in the southern and one in the northern Slave Province were explored by surface and diamond drilling.

Properties are discussed in the order shown in Figure V-3.

PENNY CLAIMS	Gold
United Reef Petroleums Ltd.,	76 B/13
8, King Street E,	64°50'N, 107°43'W
Toronto, Ontario M5C 1B7	

REFERENCES

Schiller and Hornbrook (1964)

PROPERTY

PENNY 1-12

LOCATION

The property straddles the Back River, 270 miles northeast of Yellowknife.

HISTORY

In 1961 Cominco Ltd. discovered gold in the area and staked the TOBY and RUBY claims. Following geological mapping, diamond drilling, prospecting and EM and magnetic surveying in the 1960's, the claims lapsed in 1973. In 1974 J. McMullin and J. Tindale staked part of the area previously covered by the TOBY and RUBY claims as the PENNY claims and shortly after Cominco Ltd. restaked the rest of the area as the GAS claims. The PENNY claims were transferred to United Reef Petroleums Ltd. in 1975.

DESCRIPTION

This property, on the margin of the Back River volcanic complex (Figs. V-3, V-4), is underlain by mafic volcanic rocks, greywacke, slate and impure quartzite of the Yellowknife Supergroup which are intruded by diorite and feldspar porphyry. Gold, pyrite and pyrrhotite occur in brecciated argillite and a network of quartz veins near cherty iron formation at the volcanic-sedimentary contact.

CURRENT WORK AND RESULTS

VLF-EM and magnetic surveys, geological mapping at a scale of one inch to 100 feet and geochemical rock sampling explored the gold potential of the claims. Pyrrhotite-bearing argillites, cherty iron formation, diorite intrusives, and two northeast striking faults were outlined by the magnetic survey. The EM survey outlined east trending faults and a conductor coincident with a sulphide-bearing argillite breccia.

Samples taken from the sulphide breccia, quartz veins, volcanic rocks and iron formation averaged 0.03 oz/ton Au. A sample of the iron formation was reported to contain 0.71 oz/ton Au.

GAS, JAC, SY CLAIMS	Gold
Cominco Ltd.,	76 B/13
200, Granville Square,	64°50'N, 107°43'W
Vancouver, B.C. V6C 2R2	

REFERENCES

Lambert (1976); Schiller (1965); Schiller and Hornbrook (1964); Wright (1957, 1967).

PROPERTY

GAS 1-33; JAC 1; SY 1-4

LOCATION

The claims cover the west shore of the Back River just northeast of Heywood Range, 270 miles northeasterly of Yellowknife, and lie on the eastern margin of the Back River Volcanic Complex (Figs. V-3, V-4).

HISTORY

Geological mapping, geophysics and diamond drilling by the Consolidated Mining and Smelting Company Limited from 1962 to 1964, tested auriferous quartz veins and stockworks in the area.

Cominco staked the GAS claims in the fall of 1974 and the JAC and SY claims in 1975, to cover most of the ground previously staked as the TOBY and RUBY groups, which lapsed in 1972. The Cominco property extends west of the earlier TOBY group onto ground held by the Big Four Syndicate as the OX group in the early 1960's. Part of the TOBY group was restaked in 1974 as the PENNY claims, which were transferred to United Reef Petroleums Limited in 1975.

DESCRIPTION

Felsic to mafic volcanics, carbonate cemented breccia and oxide, sulphide and minor carbonate iron formation are overlain by greywacke and argillite on the east side of the claims. Gold occurs sporadically in carbonate-filled fractures in veins of coarsely crystalline, black and white quartz. The quartz veins are especially abundant in sediments overlying an oxide iron-formation at the sediment-volcanic contact. Structure is relatively simple in the north and south of the claim block compared with the folded central part.

CURRENT WORK

The geology of the claims was mapped at a scale of 1:5,000 and several EM conductors, without magnetic correlation were outlined on the south part of the property.

PAN CLAIMS | Gold
Precambrian Shield Resources Ltd., 76 E/11
11th Floor, 65°40'N, 111°13'W
9945 - 108 Street,
Edmonton, Alberta.

REFERENCES
Gibbins (1974); Tremblay (1976)

PROPERTY
PAN 1-36

LOCATION
The PAN claims are 10 miles southwest of Contwoyto Lake.

HISTORY
The ground was staked in 1962 for Precambrian Mining Services Ltd., who mapped the property at one inch to 1,000 feet in 1963. The claims lapsed and were restaked in early 1974 by N.J. Byrne, and optioned to Precambrian Shield Resources Ltd. and Numac Oil and Gas Ltd.

DESCRIPTION
Near the centre of the claim block on PAN 9 gold is associated with garnetiferous amphibolite which contains lenses and layers of quartz concordant with bedding, and cross cutting quartz veins. The amphibolite lies in phyllite and the results of a magnetometer survey suggest that it may have been folded in the vicinity of the PAN 9 showing. The trenched section of the amphibolite strikes northwest, and is 20 to 25 feet wide. Pyrrhotite, pyrite, arsenopyrite and minor chalcopyrite form disseminations and massive layers and lenses in the amphibolite.

CURRENT WORK
A detailed magnetometer survey on PAN 9 found that the amphibolite locally has magnetic expression. A diabase dyke, in the southwest part of the claim, also has strong magnetic expression.

P, Q, R, X, CLAIMS | Gold, Silver
Arcadia Explorations Ltd., 76 M/11
9th Floor 67°43'N, 111°30'W
900, West Hastings Street,
Vancouver, B.C. V6C 1G3

REFERENCES
Fraser (1964); Gibbins *et al.*, (1977); Padgham *et al.*, (1976); Schiller (1965); Thorpe (1966).

PROPERTY
42 P, 20 Q, R 21, 28, 33, X 1-7

LOCATION
The property is 10 miles southwest of Grays Bay (Figs. V-8, V-9).

HISTORY
The P, Q and R claims were staked in 1972, the X claims in 1973. All were acquired by Arcadia Explorations Ltd. in 1974. The area had been staked and explored previously (Padgham *et al.*, 1976). Three holes, totalling 200 feet, drilled in 1973 on claims P24, 52, 53 tested the Boundary and North veins. In 1974 the North vein was tested by 4,502 feet of drilling in 34 holes, and 1,425 feet in 9 holes were drilled on the Sidewalk Vein (Gibbins *et al.*, 1977). In 1975 Giant Yellowknife Mines optioned the property.

DESCRIPTION
The claims cover part of a northerly branch of the Run Lake greenstone belt, which consists of intermediate to felsic metavolcanics and overlying metasediments cut by felsic intrusives and diabase dykes. Gold-bearing quartz veins on the property can be traced discontinuously for over a mile.

The gold is associated with pyrite, galena, chalcopyrite and hematite concentrated in the sheared and shattered walls of the veins. The North Vein trends northeast for roughly two miles in a syeno-diorite intrusion, is up to 7.5 feet wide and dips vertically. The East Boundary Vein trends north for 1,675 feet in syeno-diorite, is up to 10 feet wide, averages 4 feet wide and dips vertically.

CURRENT WORK AND RESULTS
Diamond drilling of 4,332 feet in 18 holes on claims P 24, 52, 53, 56, Q 43, 49 and X 1, tested part of North and East Boundary Veins. Seven holes probed the North Vein and 11 the East Boundary Vein. Isolated concentrations of as much as 0.79 oz/ton Au were intersected on the North Vein and one intersection assaying 0.32 oz/ton Au was encountered on the East Boundary Vein.

BANTA CLAIMS | Gold
J.J. Banta, 86 B/11
301, Maple Ridge Towers, 64°43'N, 115°28'W
Haney, B.C.

REFERENCES
Lord (1942)

PROPERTY
BANTA 1-6

LOCATION
The claim group lies about six miles southeast of Rodrigues Lake, 155 miles north-northwest of Yellowknife.

HISTORY
Ground originally staked as the JM claims by United New Fortune Mines Ltd. in the 1940's was restaked as the BANTA claims in 1973 by J.J. Banta. There is no evidence of previous work on the property.

DESCRIPTION
The property on the western margin of the Indin Lake supracrustal belt (Fig. V-3) is underlain by proterozoic metasedimentary roc s of the Snare Group and Archean volcanic rocks of the Yellowknife Supergroup. Granitic rocks of probable Archean age outcrop to the east.

CURRENT WORK AND RESULTS
Two trenches were excavated and 12 samples containing trace to 0.058 oz/ton Au were collected.

BULLMOOSE LAKE PROPERTY
Duke Mining Ltd.,
7017 - 83 Street,
Edmonton, Alberta T6C 2Y1

Gold
85 I/7
62°21'N, 112°45'W

REFERENCES
Baragar and Hornbrook (1963); Henderson (1941); Lord (1951); Gibbins *et al.*, (1977); Padgham, Kennedy *et al.*, (1975).

PROPERTY
DS 1-11; TA 1-6

LOCATION
The property is at Bullmoose Lake, four miles west of Francois Lake in the Southern Slave Province (Fig. V-3). A 32 mile winter road leads to the property from the mouth of the Francois River on Great Slave Lake.

HISTORY
The TA group was staked for Consolidated Mining and Smelting Limited in 1939. After prospecting, trenching and drilling a shallow inclined shaft was sunk in 1941 and about 80 feet of drifting was done at a depth of 50 feet (Lord, 1951). A small mill processed a few tons of material. W.L. MacDonald of Yellowknife obtained the TA claims in 1961 and in 1962 additional drilling and trenching were done.

Duke Mining Ltd. acquired the claims in 1967 and prospected, trenched and did over 12,000 feet of diamond drilling. Terra Mines Ltd. optioned the claims in 1974 and made preparations for underground exploration.

DESCRIPTION
Auriferous quartz-veins on the claims are hosted by nodular schistose meta-greywackes. The north striking, steeply east dipping No. 1 vein is exposed in a trench near the 1975 decline portal, 600 feet northwest of the camp. It contains a 50 foot long 1.4 foot wide section grading 0.5 oz/ton Au. Vein No. 2 strikes northwest, dips northeast and is exposed approximately 1,000 feet west of the camp and 450 feet southwest of the decline portal. The subparallel Nos. 3 and 4 veins strike northwest and are 150 and 300 feet northwest of the old Canadian Mining and Smelting Ltd. inclined shaft. Vein No. 4 dips approximately 70° to the northeast.

CURRENT WORK
A northwesterly directed decline was driven approximately 225 feet at a 15% grade. Drifts were advanced northeast and southwest on the 50 foot level and a short raise on a vein excavated from the southwest drift. The northeast drift cut a narrow extension of the No. 1 vein. The northerly dipping diabase dyke which is exposed near the portal was encountered near the vein intersection. A drift to the southwest, where assay results on the No. 2 vein were more encouraging was the major effort of 1975.

EILEEN CLAIMS
Andex Mines Ltd.,
805, 543 Granville Street,
Vancouver, B.C.

Gold
85 I/7
62°27'N, 112°40'W

REFERENCE
Henderson (1976).

PROPERTY
EILEEN 1-10

LOCATION
The claims are on the west side of Cliff Lake about six miles west of Francois Lake.

HISTORY
Extensive trenching and pitting on the property in 1941 and 1942 was followed by excavation of five more pits in 1947. In 1949 four holes, totalling 457 feet, were drilled between the small lake on EILEEN 8 and 9 and the pond at the southwest corner of EILEEN 4. The ground has been staked intermittently since 1949, and was acquired by Andex Mines Ltd. from D. Nickerson of Yellowknife.

DESCRIPTION
In the central part of the claim group, eight northwesterly striking quartz veins cut sediments of the Yellowknife Supergroup in a 4,500 by 1,200 foot area. Representation work records do not indicate whether or not these veins are gold bearing.

CURRENT WORK
Andex drilled ten holes on the property but the work was not reported for assessment, and since the claims have lapsed, the results were probably discouraging.

STORM CLAIMS
J. Irwin,
Kelowna, B.C.

Gold, Tungsten
85 I/7, 10
62°30'N, 112°55'W

REFERENCES
Gibbins *et al.*, (1977); Henderson (1941); Henderson (1976); Lord (1951).

PROPERTY
STORM 1-13

LOCATION
The claims lie on the southeast side of Consolation Lake, about 45 miles east of Yellowknife.

HISTORY
STORM 1-4 staked for J. Irwin in 1972 and STORM 5-13 staked by R. Lees in 1974 cover ground previously held as STORM 1-6 staked in 1940, APR 1-8 staked in 1968 and BEA 1 staked in 1971. The original STORM claims were staked by J. Irwin and H. Lang in 1940. Tungsten Developers operated a small mill on the property in 1942 and processed 11 tons to produce 1,917 pounds of concentrate, grading 35% WO_3, (Lord, 1951).

DESCRIPTION
The claim group is underlain by greywacke and minor slate, impure quartzite and argillite of the Yellowknife Supergroup. Quartz veins, six inches to four feet wide, contain minor amounts of visible gold, scheelite and fine-grained pyrite. Most trend parallel to the steeply dipping, north-northwest striking bedding in the sediments but some occupy transverse fractures. The scheelite was extracted from veins in the eastern portion of STORM 2.

CURRENT WORK AND RESULTS
J.J. Crowhurst of Bacon and Crowhurst Ltd. evaluated the property for Starbird Mines Ltd. in 1975. A series of trenches on the western portion of STORM 2 expose the principal gold-bearing vein

that extends discontinuously for 106 feet and contains an average of 0.83 oz/ton Au over 25 inches. A sample from a 20 inch section of this vein assayed 3.86 oz/ton Au.

AP CLAIMS — Gold
Precambrian Shield Resources Ltd., — 85 I/14
11th Floor,
9945 - 108 Street,
Edmonton, Alberta T5K 2G6

REFERENCES
Henderson (1976); Henderson and Jolliffe (1941); Gibbins *et al.*, (1977).

PROPERTY
AP 1, 3, 4, 6-9, 18-21

LOCATION
The property is on the east side of the Cameron River downstream from Myrt Lake about 40 miles northeast of Yellowknife.

HISTORY
The AP claims were staked by D. Nickerson in 1974 and were mapped and prospected on behalf of Nemco Exploration Ltd. Precambrian Shield Resources Ltd. obtained the property in 1975.

DESCRIPTION
The claims are underlain mainly by volcanics that are in contact with greywackes and slates southwest of the Cameron River. A tongue of felsic volcanics bounded by mafic and intermediate volcanics extends northwest from the southeast corner of the claims. Samples collected in 1974 from gossans and sulphide-bearing volcanics contained only traces of gold. Gold has previously been reported with arsenopyrite on the claims.

CURRENT WORK AND RESULTS
During 1975, a strip of ground about 7,000 by 500 feet, along the volcanic-sedimentary contact zone was mapped at one inch to 200 feet. Ground magnetic and EM surveys outlined a moderately good conductor flanked by a magnetic anomaly. Sulphide mineralized felsic agglomerate apparently is the cause of the anomalies. Four holes totalling 1,459 feet were drilled. Weak gold mineralization is accompanied by low zinc and copper values; the best zinc assay was 1.04% across ten feet. Gold mineralization is hosted by both volcanics and sediments; the best values being from sulphide mineralized intermediate tuff.

CAMLAREN MINE — Gold, Silver
Discovery Mines Limited, — 85 I/14
Suite 1011, 2200 Yonge Street, — 62°59'N, 113°12'W
Toronto, Ontario M4S 2C6

REFERENCES
Gibbins *et al.*, (1977); Henderson (1976): Henderson and Fraser (1948); Lord (1951); McGlynn (1971); Schiller (1965); Thorpe (1972).

PROPERTY
CAMLAREN 1-6, 16-20, 22, 31-34; FM 1-4 and FM 2A fraction.

LOCATION
The property lies near the east shore of Gordon Lake, 53 air miles northeast of Yellowknife.

HISTORY
In 1937, after diamond drilling had indicated high grade gold mineralization on the CAMLAREN claims, Camlaren Mines Limited was incorporated. A 380-foot shaft sunk on the Hump vein, with drifts and crosscuts on the 200 and 350 foot levels outlined 13,177 tons grading 0.62 oz/ton Au. A second shaft sunk on the 31 vein and diamond drilling on the H-vein failed to locate ore shoots. Additional exploration in 1958 by Consolidated Northland Mines Limited indicated reserves of 15,000 tons grading 0.9 oz/ton Au on and around the Hump vein.

In 1962 Discovery Mines Limited mined the best section of the Hump vein above the 350 foot level and in 1963 12,174 tons shipped by winter road to the Discovery Mill produced 13,885 ozs. Au and 3,738 ozs. Ag. Work was suspended until 1974 when Discovery Mines Limited rehabilitated the plant, deepened the shaft to 840 feet, dewatered two old levels and established two new levels to earn a $66^2/_3\%$ interest in the property.

The FM claims cover ground first staked in the nineteen thirties and since held by various owners under various claim names.

DESCRIPTION
Thinly bedded slates and greywackes of the Yellowknife Supergroup on the claims are cut by gold-bearing quartz veins.

The 3 to 4 feet wide Hump vein strikes parallel to the enclosing sedimentary rocks on the nose of a northeast striking anticline that plunges 50° to 55° northeast. Fine powder gold within the quartz is generally closely associated with less than 1% sulphides, mainly pyrite, chalcopyrite, galena and sphalerite.

CURRENT WORK AND RESULTS
Development of the mine continued into 1975 but no additions were made to the semi-proven reserves of 56,000 tons grading 0.62 oz/ton gold. Because the deposit is open to depth below 1,000 feet, the FM claims adjoining the property to the north were purchased to cover the deposit's downward projection. A geological compilation and an evaluation of these claims was made.

MAY CLAIMS — Gold
Encore Resources, — 85 I/14
1700 Cambridge Building, — 62°57'N, 113°16'W
10024, Jasper Avenue,
Edmonton, Alberta.

REFERENCES
Henderson (1976); Henderson (1941c).

PROPERTY
MAY 1-6

LOCATION
The claims cover islands at the south end of Gordon Lake about three miles southwesterly of Camlaren Mine.

HISTORY

Sovereign Yellowknife Mines Ltd. drilled 18 holes totalling 1,619 feet on the property in 1947 when it was held as the FLIGHT claims. Thirteen holes intersected vein quartz and one hole returned an assay of 0.78 oz/ton Au across six feet. One hole intersected minor copper mineralization but no gold values were reported.

D. Nickerson staked the MAY claims in 1972 and 1973 and optioned them to Encore Resources.

DESCRIPTION

Northerly striking locally auriferous quartz veins cut steeply dipping northwesterly striking slates and greywackes on the claims. A northwesterly striking synclinal axis has been mapped across the northeastern part of the property (Henderson, 1941c).

CURRENT WORK

A geological evaluation completed for Encore Resources was hampered by the water level which rendered one showing inaccessible for sampling. Chip and grab sampling tested quartz veins exposed on surface and in trenches.

ROD CLAIMS	Gold
Dave Nickerson,	85 J/8, 9
Box 1778,	62°30'N, 114°26'W
Yellowknife, N.W.T.	

REFERENCES

Henderson J.B. (1978); Jolliffe (1942, 1946); Schiller and Hornbrook (1964).

PROPERTY

ROD 1-11

LOCATION

The claims are at the southwest end of Baker Lake within Yellowknife's city limits. Three miles of bulldozed trail connect the property to the Yellowknife Highway. In summer the road can be negotiated by all-terrain vehicles and in winter by trucks.

HISTORY

Rodstream Yellowknife Gold Mines Ltd. staked 43 claims in the J, JC, C and R groups on granitic rocks west of Yellowknife in 1962. The best gold showings, the No. 15 and No. 22 zones, are on claim R1. All 43 claims lapsed in January, 1975 and were restaked that year as the ROD group by Dave Nickerson. The No. 15 zone is covered by ROD 7 and the No. 22 by ROD 6.

DESCRIPTION

The property is underlain by pink and white granodiorite enclosing metavolcanic xenoliths and cut by numerous pegmatite and aplite dykes. Gold is associated with quartz-filled fractures or zones several inches to several feet wide. Hematitic alteration is common in and near fractures.

CURRENT WORK AND RESULTS

In 1975, during a geological evaluation of the claim area by D. Nickerson, samples were collected from a stockpile of vein material, hand picked from two excavations made on the No. 15 zone. The samples from the stockpile averaged 3.92 oz/ton Au. Five chip samples from the excavation were analyzed.

YT CLAIMS	Gold
Nugget Syndicate held in trust by:	85 J/8
Geophysical Engineering Limited,	62°20'N, 114°25'W
P.O. Box 49,	
Toronto-Dominion Centre,	
Toronto, Ontario.	

REFERENCES

Boyle (1961); Henderson (1978); Henderson and Brown (1966); Jolliffe (1942).

PROPERTY

YT 1-72

LOCATION

The claims cover a group of islands along the southwest margin of Yellowknife Bay, 10 miles south of Yellowknife.

HISTORY

Mapping and drilling by Consolidated Mining and Smelting Company Limited between 1947 - 1950, traced the Campbell Shear zone southward to Kam Point, 3 miles north of the claims. In 1950-51 Yellowknife Bear Mines drilled six holes on the Hope group three miles southwest of Kam Point. Hole H-6, on Hope 14, cut a well-defined zone of sericite-chlorite schist containing quartz-carbonate veins but assay results are not known. In 1961 Cominco's drill programme on the Kamex group indicated the Campbell shear zone extends southwest of Kam Point. Drill hole KA-6 on Kamex 24 about $1^1/_2$ miles northeast of the YT claims intersected material averaging 0.28 oz/ton Au across 20.3 feet.

The YT 1-72 claims were staked in 1973 and transferred in escrow to Robert J. Wright in 1975.

DESCRIPTION

YT 1-72 are underlain by Archean mafic to intermediate flows, breccia, chert, tuffs and sills and dykes of the Kam Formation of the Yellowknife Supergroup. These are cut by north trending diabase and gabbro dykes. Quartz-chlorite schist zones associated with the metagabbro dykes contain finely disseminated chalcopyrite, arsenopyrite and pyrite.

CURRENT WORK AND RESULTS

The aim of the project was to find shearing and possible associated alteration and mineralization near the inferred southwest extension of the Campbell Shear zone. This quest was unsuccessful; perhaps because of the paucity of outcrops. The property was mapped at one inch to 200 feet.

JAX LAKE PROJECT	Gold
Jomial Investments Ltd.,	76 D/3, 6
5, 932 - 12 Avenue S.W.,	64°08' - 64°20'N
Calgary, Alberta.	111°18' - 111°25'W

REFERENCES

Baragar (1961, 1962); Gibbins *et al.*, (1977); Moore (1951, 1956).

PROPERTY

BLAKE 1-32; DW 1-33; KR 1-9; TONY 1-48

LOCATION

The claim groups lie just north of Courageous Lake, 155 miles northeast of Yellowknife.

HISTORY

Gold was discovered in the area in 1939. Newnorth Gold Mines Ltd. staked 28 claims in 1945 and trenched and diamond drilled five gold showings in 1946. In 1960 the Big Four Syndicate restaked four of the showings as the JAX group. Diamond drilling and trenching intersected three feet averaging 1.16 oz/ton Au on the No. 1 showing and three feet averaging 0.40 oz/ton Au on the No. 2 showing. The JAX claims lapsed and in 1973 the TONY, KR, BLAKE and DW claims were staked for Golden Ram Resources Ltd. Diamond drilling, geophysical and geochemical surveys located gold-bearing quartz veins in amphibolite on the DW claims. In 1974 trenching and mapping traced the surface exposure of these veins. The best assay of surface samples was 0.284 oz/ton Au over 0.5 feet.

DESCRIPTION

The area is underlain by Archean Yellowknife Supergroup volcanic and sedimentary rocks of the Courageous Lake Supracrustal Belt (Fig. V-3) that are intruded by granitic rocks and diabase dykes. Quartz veins and lenses containing gold, pyrite, arsenopyrite and galena occur discontinuously in shear zones over a distance of 22 miles at or near the volcanic-sedimentary contact.

CURRENT WORK AND RESULTS

VLF-EM, magnetic and IP surveys in 1975 delineated the volcanic-sediment contact. Geochemical lake sediment and soil sampling delineated five arsenic-gold anomalies at or near the volcanic-sediment contact.

SALMITA (BLUEBELL) PROJECT	Gold
Giant Yellowknife Mines Ltd.,	76 D/3
Yellowknife, N.W.T.	62°02'40"N, 111°12'20"W

REFERENCES

Folinsbee and Moore (1950); Lord (1951); McGlynn (1971); Moore (1956).

PROPERTY

LT 1-3; LUFF 1-4; SALERNO 1-18; TOUGH 1-6

LOCATION

The claims are on the east shore of Matthews Lake, a small lake lying between Courageous and Mackay Lakes.

HISTORY

F. Salerno staked 18 claims in 1945 on a gold discovery and Salmita Northwest Mines Ltd. was incorporated to develop the property. Three more claims were staked in 1946, and an additional 10 claims were staked after Salmita Consolidated Mines Ltd. acquired the property in 1949.

Prior to 1951 exploration included trenching and several thousand feet of diamond drilling in over 100 holes on the North, South, Southeast and Olsen showings. A 145-foot shaft was sunk on the North Showing and 116 feet of crosscutting and drifting completed on the 125-foot level in 1951. The B Vein on this level contains an average of 0.70 oz/ton gold. Diamond drilling on the B Vein had indicated 19,500 tons grading 0.48 oz/ton gold in a 340 foot long, 4.5 foot thick block between the surface and the 150-foot level. A 260 pound bulk sample tested by the Mines Branch, Ottawa, contained 0.93 oz/ton Au and 0.285 oz/ton Ag. In 1952 some equipment for a 100 tons per day mill was shipped to the property.

Mack Lake Mining Corporation Ltd. optioned the property in 1954 and absorbed Salmita Consolidated Mines Ltd. in 1961. No work was done until the company was dissolved in 1970. A lease was assigned to Bluebell Enterprises Ltd. in late 1973 and Giant Yellowknife Mines optioned the property in December, 1974.

DESCRIPTION

The gold showings lie near the two-mile wide Courageous Lake volcanic belt (Fig. V-3) which extends north-northwest for 40 miles from five miles south to Mackay Lake. Dips of bedding, foliation and veins are mainly steep easterly. The belt is in contact with intrusive granitic rocks to the west and with the overlying metasediments to the east. The claims cover the contact between mainly felsic volcanics and the metasediments on the east side of the belt. The North Zone on SALERNO 14 and 16 lies within the main body of the volcanics, but the B vein, which is part of the North Zone, lies along or near the contact of a thin slate band enclosed in the volcanic sequence. The South Showing, on SALERNO 2 and 4, lies on or near the main volcanic-sedimentary contact.

The North Zone, which was worked in 1975 comprises the roughly parallel A, B, C and T veins. The B vein is the largest and extends for about 1,000 feet north-northwesterly. Dark grey slate forms much of its west wall and dark green and brown, banded medium grained, feldspar-amphibolite rock, probably an altered tuff (Lord, 1951) forms much of its east wall. A plan in a 1951 report by H. H. Slinger for Salmita Consolidated Mines shows the northern third of the B vein cutting metavolcanics (garnetiferous greenstone) while the southern third cutting metasediments and the central third with slate on the west and metavolcanics on the east wall. The vein quartz is coarse grained and grey, or fine grained and white. The quartz contains less than 1% combined pyrite, arsenopyrite, galena and sphalerite. The remaining veins of the North Zone are from east to west: the T Vein, the A Vein and the C Vein. They are enclosed in felsic metavolcanics and in sericite schists probably derived from felsic volcanics.

CURRENT WORK

A decline started on the T Vein was advanced 959 feet to a point just below the bottom level of the shaft. After cutting through the volcanics between the T and B veins the decline follows the B Vein and makes several changes of direction.

A 78 foot long trench was excavated. The feasibility of operating a 100 tons per day mill was studied.

Lithium Exploration

Several properties that were explored for lithium have been grouped together under the heading 'Lithium Project'. Figure V-12 shows the various properties. The NITE claims reported separately lie slightly to the west of the area shown in the figure.

LITHIUM PROJECT
Canadian Superior Exploration Ltd.,
2201-1177 West Hastings Street,
Vancouver, B.C.

Lithium
85 I/1, 2, 5, 7, 8, 11, 12, 13

REFERENCES
Henderson (1941); McGlynn (1971); Rowe (1952); Henderson (1976); Lasmanis R. (1978).

PROPERTY
BET 1-2; BIG 1-13; BIN 1; FI 2-7, 9-14; HID 1; KI 1-5; LENS 1; MAC 1; MUT 1; THOR 1-13; VO 1-9.

LOCATION AND ACCESS
The eleven claim groups lie to the northeast and east of Yellowknife, (Fig. V-12).

The THOR claims cover ground staked as the ECHO group in 1955 by North American Lithium Company Limited. Surface sampling and mapping of the pegmatite bodies was done that year. In 1958 J.R. Woolgar sent a ton of trench material for laboratory and metallurgical testing and two X-ray holes, totalling 227 feet, were drilled on the central dyke of the ECHO Group. There has been no work since 1959 when the claims were evaluated by E.P. Chapman Jr.

The THOR claims cover ground staked as the JO group by W. Beltes in 1955. Several trenches have been excavated in the pegmatite bodies.

On the HID claims, there are several old trenches. Claims LITA 1-6 held by Frobisher Exploration Company Limited covered the pegmatite in 1945.

The Mac pegmatite, now staked as the MAC claims, was discovered in 1940 by W.L. MacDonald of Yellowknife and staked as the LITA group. Several trenches were probably dug at that time. In 1947 the area was staked for DeStaffanex Tantalum Beryllium Mines Ltd. The property was subsequently held by

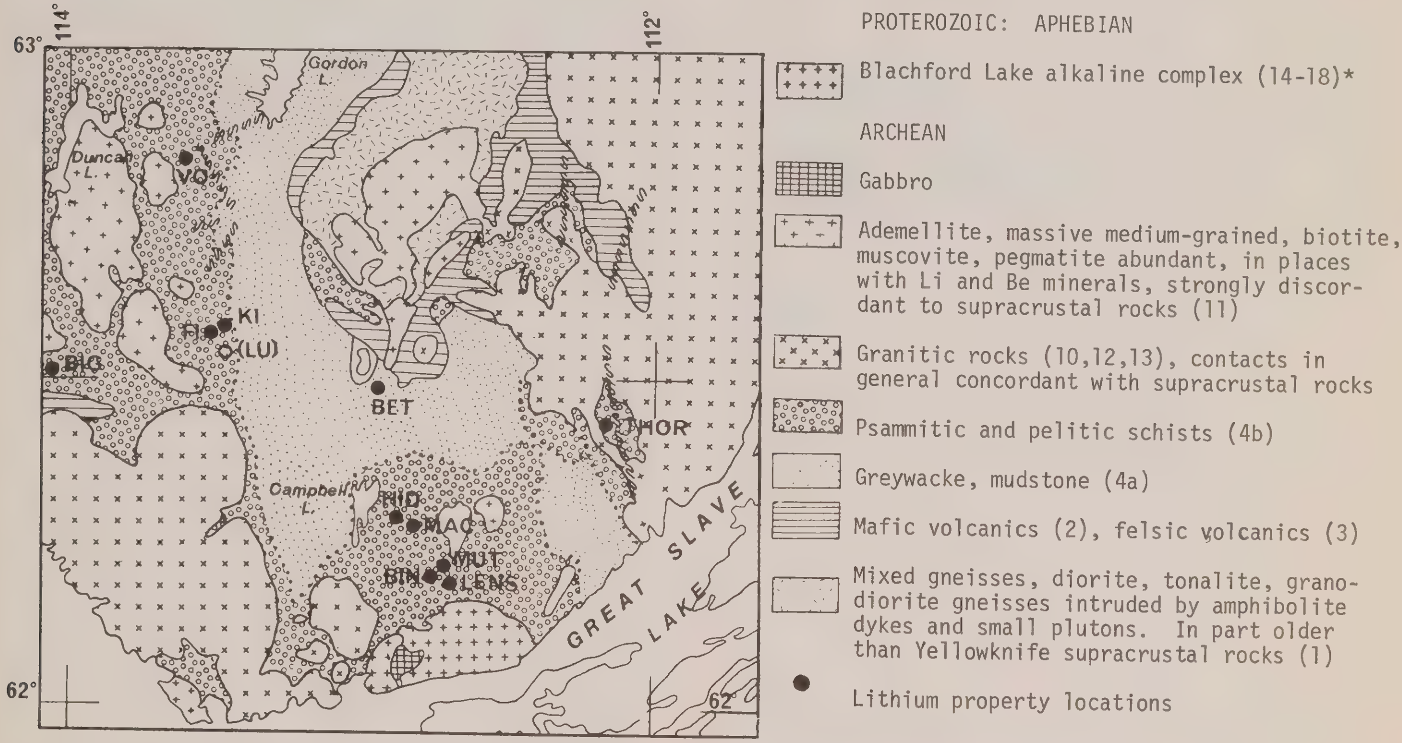


Figure V-12: Locations of lithium bearing pegmatites explored by Canadian Superior Exploration Limited in 1975. Geology west of longitude 112° simplified after Henderson (1976); East of 112° after Brown (1950). Bracketted numbers in legend refer to units of Henderson (1976).

HISTORY
Although all the claims were staked in 1975, several of the showings had been previously worked. The VO claims cover ground staked as the COTA group in 1955 by F.N. Nasso and optioned to General Lithium Corporation. Two diamond drill holes totalling 1,233 feet tested several of the lithium bearing pegmatites.

Boreal Rare Metals and as the LIT group by Beauport Holdings Limited.

The BIG claims cover the BH pegmatite previously staked as the UM 1, 2, 36 and MURPHY 3 claims and the BB pegmatite covered by the MURPHY 2, 10 and 12 claims. General Lithium Corporation acquired these claims in 1955 and that year tested the BH zone with 2,216 feet of diamond drilling in 9 holes and the

BB zone with 3,386 feet in 6 holes. No assay results are available. In 1956, National Lithium Corporation formed to take over several properties including the Bighill pegmatite zones, continued trenching and drilling.

The BET claims cover ground staked in 1944 by DeSteffanex Tungsten Gold Mines Limited as the BEST BET claims which were then transferred to DeStaffanex Tantalum Beryllium Mines Limited in 1945. In 1952 Boreal Rare Metals acquired the claims and a 125 tons per day mill was constructed on the nearby Moose Property. Mining continued on an intermittent basis from December, 1958 to August, 1964. Diamond drilling of 9 holes in 1964 tested the lithium content of the pegmatite dyke. In 1957, when the assets of Boreal Rare Minerals Limited were purchased by Beauport Holdings Limited, the claims were allowed to lapse.

The FI claims cover ground formerly held by two different companies. FI 2-7 were originally the J.M. group which, in 1956, was optioned by Lithium Corporation who trenched and drilled 848 feet that year. In 1956, Affiliated Lithium Mines Limited acquired the neighbouring LIT groups.

DESCRIPTION

All the claims are underlain by greywacke, slate, arkose and quartzites of the Archean Yellowknife Supergroup. The lithium-bearing pegmatite are in metamorphic aureoles developed in these sediments during granitic intrusion and can vary in size from small stringers to zones several hundreds of feet long and as much as 30 to 40 feet wide. The lithium occurs in small spodumene crystals evenly distributed throughout simple felsic pegmatites or in zoned pegmatites where large spodumene and amblygonite crystals form distinct concentrations. The pegmatites average about 1 to 1.5% Li.

CURRENT WORK AND RESULTS

Most of the major pegmatite dykes on the claim groups were mapped and sampled and old trenches were cleaned and sampled.

NITE CLAIMS	Lithium
Canadian Superior Exploration Ltd.,	85 J/9
2201-1177 West Hastings Street,	62°32'N, 114°08'W
Vancouver, B.C.	

REFERENCES

Henderson (1976); Henderson and Joliffe (1941); Joliffe (1944); Kretz (1968); Lasmanis (1978); McGlynn (1971); Rowe (1952).

PROPERTY

NITE 1-3, 5-7.

LOCATION

The claims are one mile south of Prosperous Lake, 8 miles northeast of Yellowknife.

HISTORY

In 1955, Nor' Arium Minerals Ltd. staked the LI claim group. After exploration in 1956 the claims lapsed. The ground was restaked as the NITE group in July, 1975 by Canadian Superior Exploration Ltd.

DESCRIPTION

The NITE group is underlain by quartz biotite schist of the Yellowknife Supergroup. The Prosperous granite outcrops one mile north of the property. Steeply dipping, northeasterly striking pegmatite dykes intruding the sediments include the main NITE dyke which has an average width of 30 feet and a strike length in excess of 3,000 feet. The pegmatites exhibit a simple mineralogy and contain appreciable amounts of pale green spodumene crystals.

CURRENT WORK AND RESULTS

All the pegmatite dykes on the property were mapped and sampled.

NAHANNI REGION

C. Lord[1]

D.I.A.N.D., Geology Office, Yellowknife

The Nahanni Region extends from Inuvik south to Fort Simpson and from the mountains just east of the Mackenzie River to the Yukon border.

There was substantially less mineral exploration in the Nahanni Region during 1975 than during the previous hectic years. This decline resulted from a number of factors including the high cost of exploration in the mountains, which in most cases necessitates helicopter support; a return of several companies to British Columbia, where a more favourable economic and political climate now exists for exploration; the attraction of several base metal and uranium environments in the Yukon, and the disillusionment of exploration companies with the nature of the carbonate-hosted zinc/lead deposits which are mostly small, high grade, erratic and structurally controlled. Nevertheless companies such as Shell, Rio Tinto, Canex Placer and Cominco were still searching for stratiform lead-zinc in the Road River shales in the Howard's Pass area, zinc-lead in the Helikian carbonates at Gayna River, stratabound copper in the Redstone River Formation and, to a lesser extent, barite and lead-zinc in the Besa River shales around MacMillan Pass and tungsten in the vicinity of Amax's MacTung deposit. Exploration ranged from prospecting to the fully integrated use of prospecting, geochemistry, detailed geological mapping and diamond drilling.

Numerous small high grade zinc-lead showings were found in the platform carbonates. Perhaps the most notable is the one discovered by Welcome North Mines Ltd. in the Mt. Kindle Formation on their REV group. It is apparently a fault breccia infilled with sphalerite and galena.

The Redstone River Formation, between Coates Lake and the Keele River, was studied by several companies looking for stratabound copper deposits in red beds. The discovery of copper at another locality in the Redstone River Formation (Geol. Surv. Can. Open File #298) precipitated a small hectic staking rush. Cordilleran Engineering, acting on behalf of Rio Tinto acquired perhaps one of the better prospects in this new area. Other companies which acquired small blocks of claims included Serem, Shell, Noranda, Harmon Management and Welcome North.

Diamond drilling by the Canex Placer/Essex Minerals joint venture at Howard's Pass continued to outline lead/zinc mineralization in the Road River shales of the Selwyn Basin.

There were smaller programs such as in the search for coal in the Fort Norman area, for iron and phosphate in the Richardson Mountains, and for placer gold in the tributaries of the South Nahanni River.

The following descriptions of properties in the Mackenzie Mountains are listed by metal commodity and geological environment rather than by NTS as in previous years. They are divided into:

(1) Stratabound copper in red-bed sequences
(2) Tungsten associated with quartz monzonite intrusions
(3) Stratiform lead/zinc in shales
(4) Carbonate-hosted zinc/lead
(5) Coal, iron and placer gold, copper.

Stratabound Copper Occurrences Associated with Redbeds

The release of the Geological Survey of Canada Open File Report No. 298 in late August, 1975, which described a new copper occurrence in the Redstone River Formation, precipitated a small but hectic staking rush in the area covered by the report. Numerous companies were involved and generally only small blocks of claims were acquired (Fig. VI-1).

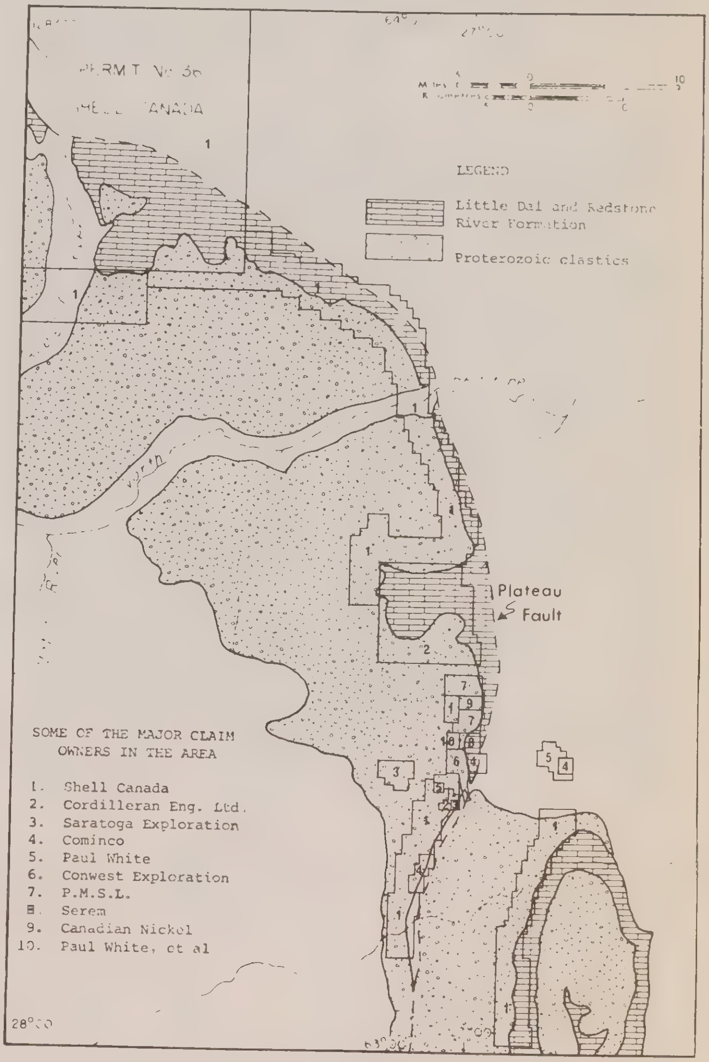


Figure VI-1: Distribution of claims along part of the Redstone Copper belt.

The Redstone River and overlying Coppercap Formations have been prospected for copper since the early 50's and 60's. Only recently has the full potential of this copper belt been realised.

[1]Nahanni Region District Geologist

The Redstone River Formation was deposited in a shallow marine basin and consists of calcareous siltstones and mudstones interbedded with gypsum and gypsiferous siltstones. In the Keele River and Coates Lake area, the transition zone with the overlying Coppercap Formation contains sheet-like and lensoid bodies of dolomitized cryptalgal micritic carbonate. The carbonate lenses were deposited under conditions similar to those that exist today in the sabkha environment along the Trucial Coast of the Persian Gulf. The lenses occur mainly in embayments of the Redstone basin shoreline between locally developed fan-conglomerates in the Keele River, Hayhook Lake and Coates Lake areas (Fig. VI-2).

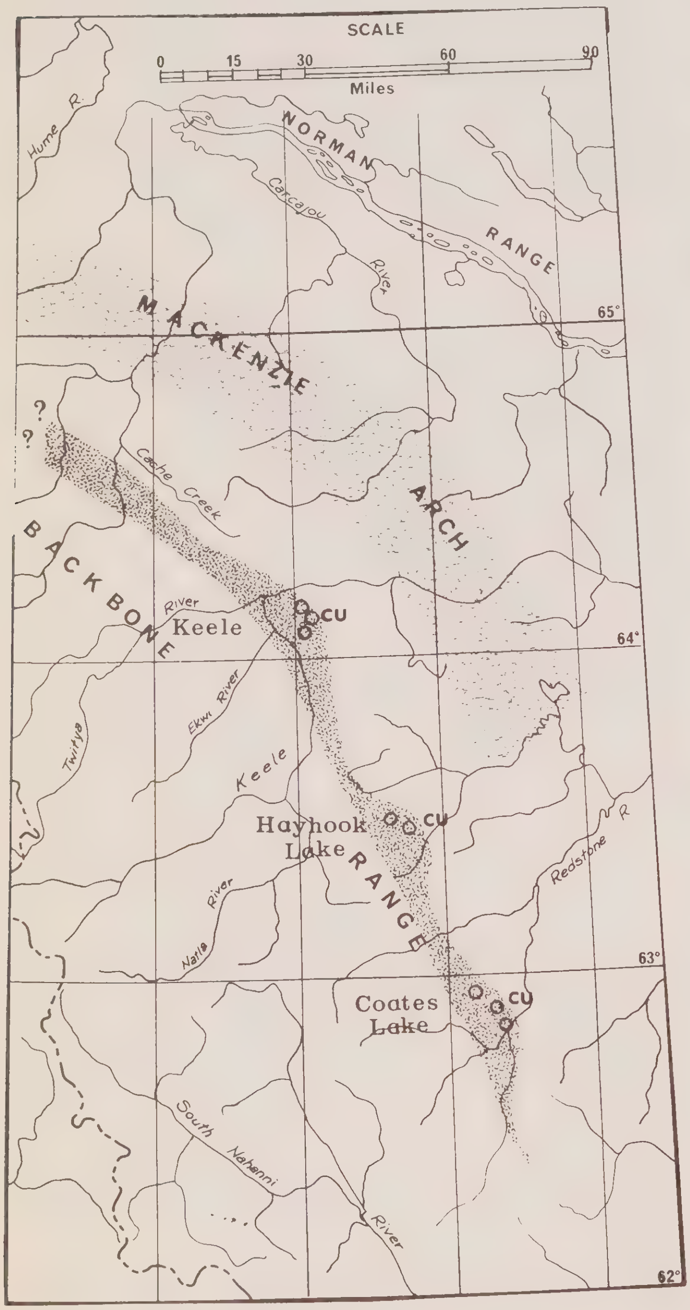


Figure VI-2: Distribution of major copper occurrences along shoreline of Redstone Basin.

These dolomitized carbonate members are the host rocks for most of the copper deposits. The copper mineralization appears to be vertically zoned in the sequence, chalcocite-bornite-chalcopyrite to pyrite which represents a decrease in the copper and increase in the iron content of the sulphides. Silver, which behaves similarly to copper in its ability to form chloride complexes, is present in minor to trace amounts. The copper sulphides are disseminated in the carbonate lenses and also infill fenestral fabrics implying an early post lithifaction deposition for the copper.

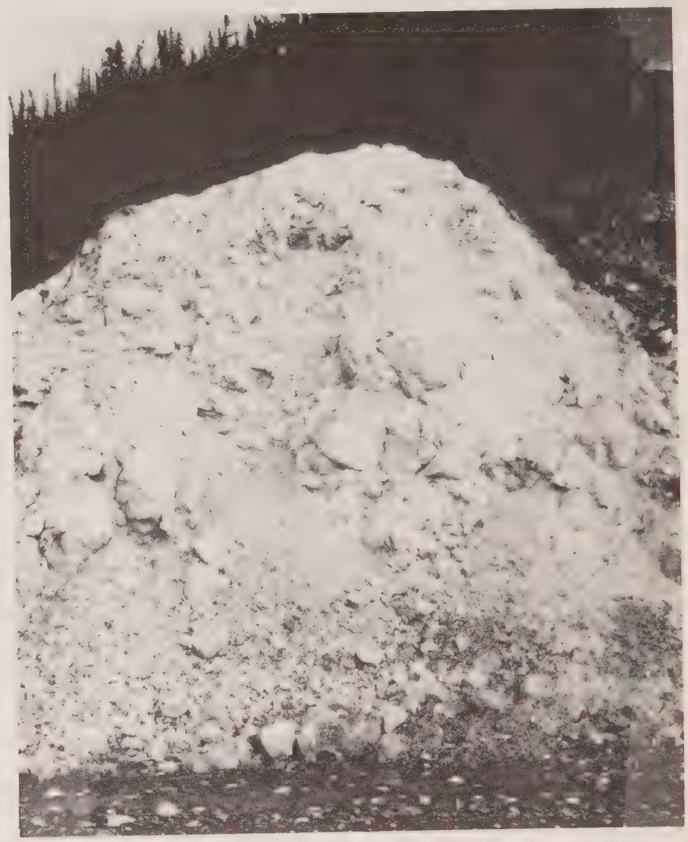


Figure VI-3: Malachite stained diatreme intruding Redstone River Formation, west of Hutch Mountain, Keele River.

A genetic model of copper deposition similar to that proposed by Renfro (1974) and modified somewhat by the later work of Rose (1976) and Jacobson (1975) has been applied to this copper belt. In this model copper is leached from the underlying clastic rocks by circulating brine solutions and deposited when reducing conditions are encountered such as in decaying algal mats. The decaying algal mats of this model are possibly represented by the cryptalgal micritic carbonates of the Redstone River Formation.

Exploration along the length of the copper belt from Coates Lake in the south to north of the Keele River has utilised an integrated approach combining prospecting, geochemical surveys, detailed stratigraphic section studies, geophysics and diamond drilling.

Figure VI-4: Pyrite, chalcopyrite in micritic cryptalgal carbonates of the Redstone River Formation

PROSPECTING PERMIT 361
Shell Canada Ltd.,
Shell Building,
Calgary, Alberta.

Copper
95 M/13
63°57'N, 127°45'W

REFERENCES
Coates (1964); Eisbacher (1976); Gabrielse *et al.*, (1973).

Property
Prospecting Permit 361

LOCATION
The permit area covers roughly 256 square miles in the northwest corner of the Wrigley Lake Map Sheet 95 M.

A landing strip suitable for Twin Otters was constructed near Hutch Mountain, just east of the Keele River, in July, 1976.

HISTORY
Prospecting Permit 361 was acquired by Shell Canada Ltd. in 1975.

DESCRIPTION
The northwest-striking Laramide Plateau thrust Fault bisects the permit area and separates the southwesterly dipping Proterozoic strata to the west from the more intensely folded and faulted Paleozoic strata to the east.

The Paleozoic strata range in age from Cambrian to Devonian and are mainly shallow water carbonates. The lowest part of the Proterozoic succession in the permit area consists of the dominantly coarse clastic Helikian Tigonankweine Formation which is overlain by stromatolitic carbonates of the Little Dal Formation. The Redstone River Formation which contains red siltstones, red mudstones and locally carbonates and evaporites, conformably overlies the Little Dal Formation and is in turn overlain by the transgressive carbonate sequence of the Coppercap Formation. Unconformably overlying the Coppercap Formation are maroon and brown shales and siltstones of the Hadrynian Lower Rapitan Formation.

Copper sulphides, in the carbonate members of the transition zone between the Redstone River and Coppercap Formations, were found in the vicinity of Hutch Mountain. These carbonate beds were the target of much of the exploration in the permit area, although the paleozoic carbonates were explored for zinc and lead.

CURRENT WORK AND RESULTS
Detailed geological mapping, stratigraphic studies and close spaced geochemical sampling explored the carbonates at the contact of the Redstone River and Coppercap Formations. Diamond drilling late in the season tested several copper showings discovered during the summer.

Figure VI-5: Mineralised bed "Zone 3" in the Redstone River Formation, Coates Lake, N.W.T.

Tungsten Associated with Quartz Monzonite Intrusions

Exploration for tungsten was mainly by Canada Tungsten Mining Corporation Ltd. who investigated anomalies outlined by an airborne geophysical survey (Turair) in the Flat River valley area (Fig. VI-6).

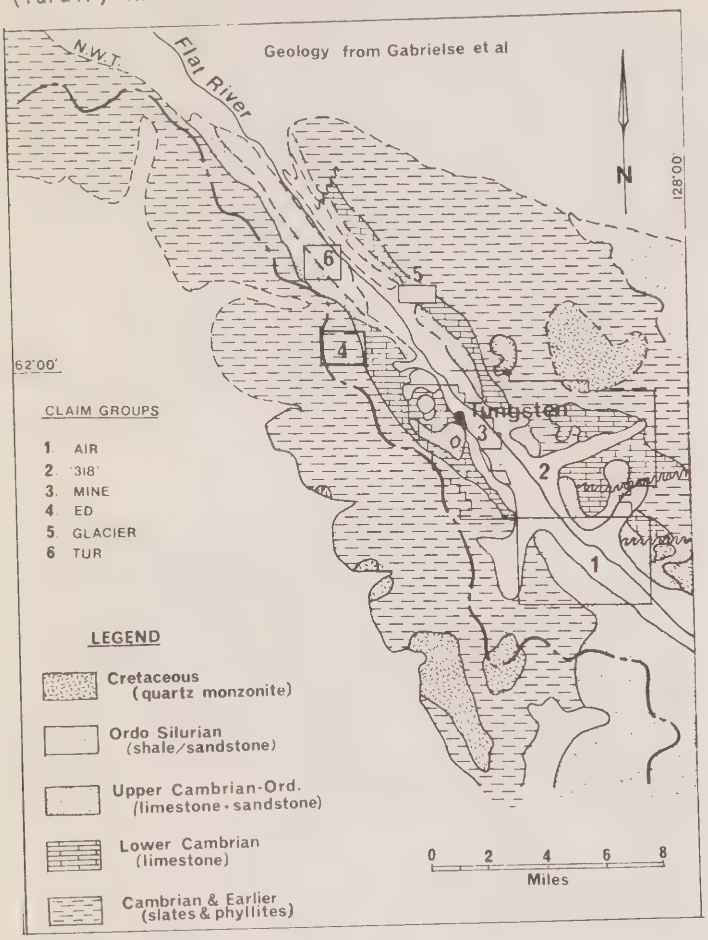


Figure VI-6: Property location map Tungsten area

The tungsten is found in scheelite ($Ca WO_4$) bearing skarns developed in limestones at or near the contact with quartz monzonite intrusions. Pyrrhotite and chalcopyrite are commonly associated with the scheelite in these pyrometasomatic deposits.

Cretaceous quartz monzonite plutons intrude along a northwesterly zone of weakness or hinge zone that existed since Cambrian times between the eastern edge of the Selwyn Basin and the platform carbonates. This structurally weak and tectonically disturbed hinge zone has been the loci for many types of mineral deposits including tungsten and lead-zinc in shales around the Howard's Pass and MacMillan Pass areas.

The geology of the area around Tungsten is described by Blusson (1968), as a series of sedimentary rocks of the northern Cordilleran miogeosyncline cut by Mesozoic granitic intrusions. The sedimentary rocks range in age from late Precambrian to Devonian-Mississippian and include well sorted sandstones, thick and thin bedded carbonates and light coloured to black, graphitic, cherty shales. Lower Cambrian and earlier rocks consist of fine-grained quartzite, sandstone, dolomite and shale; Middle Cambrian rocks consist of platey limestone, siltstone and shale, and Upper Ordovician rocks consist of black, cherty shale.

It is in the Lower Cambrian carbonates, particularly the ore or Swiss-cheese limestone of unit 3a (Blusson 1967), that the majority of scheelite bearing skarns developed. There appears to be a local stratigraphic control for the skarn distribution, with lithology of the host rock and the age and type of the intrusions having importance. Generally the more pyritic Cretaceous stocks and pure limestones are associated with scheelite development. Pyroxene-garnet-scheelite skarns have also formed in limestones of Lower Cambrian to Ordovician age and in the Ordovician limestones of the Road River Formation as in the MacMillan Pass area, which contains the MacTung deposit, i.e. 30 million tons of 0.9% WO_3.

AIR CLAIMS
Canada Tungsten Mining Corporation Ltd.,
142, Lonsdale Avenue,
North Vancouver, B.C.

Tungsten
105 H/16
61°54'N, 128°10'W

REFERENCES
Blusson (1968); Green L.H. (1968).

PROPERTY
AIR 1-150

LOCATION
The AIR group is seven miles southeast of Tungsten which is connected to Watson Lake by an all-weather road (Fig. VI-6). An airstrip just outside the town is suitable for medium-size fixed wing aircraft.

HISTORY
The AIR claims were staked in early 1975 to cover geophysical anomalies outlined by a Turair Survey.

DESCRIPTION
The claim group is situated on the eastern margin of the Selwyn Basin and is underlain mainly by graphitic calcareous shales of the Road River Formation and by the Swiss Cheese or ore limestone unit 3a (Blusson 1967). These formations have been intruded by granite stocks and sills which have only weakly altered the ore limestone, which, poorly developed in this area, is only 2 to 3 feet thick.

CURRENT WORK AND RESULTS
Diamond drilling tested several conductors outlined by a Turair Survey. Apparently the graphitic Road River Shales adequately explains these anomalies. The claims were also geologically mapped at a scale of one inch to 1,000 feet.

ED AND GLACIER CLAIMS
Canada Tungsten Mining Corporation Ltd.,
142, Lonsdale Avenue,
North Vancouver, B.C.

Tungsten
105 H/16, I/1
62°00'N, 128°25'W
62°03'N, 128°20'W

REFERENCES
Blusson (1968); Green (1968).

PROPERTY
ED 1-20; GLACIER 1-8

LOCATION
Both claim groups are 9 miles northwest of Tungsten (Fig. VI-6).

HISTORY
The claims were staked in 1975 to cover geophysical anomalies outlined by a Turair Survey.

DESCRIPTION
Thick overburden masks the bedrock but the claims are probably underlain by Proterozoic shales and argillites.

CURRENT WORK AND RESULTS
Geophysical anomalies outlined by a Turair survey were cursorily examined. It is not known whether or how these anomalies were explained.

318 GROUP
Canada Tungsten Mining Corporation Ltd.,
142, Lonsdale Avenue,
North Vancouver, B.C.

Tungsten
105 H/16
61°56'N, 128°10'W

REFERENCES
Blusson (1968); Green (1968).

PROPERTY
B 1-36; L 1-36: O 1-36; P 1-36; PK 1-36; R 1-36; V 1-36; Y 1-36.

LOCATION
The 318 group is 5 miles east of Tungsten (Fig. VI-6).

HISTORY
The 318 group was staked in 1975 to cover geophysical anomalies outlined by a Turair Survey.

DESCRIPTION
The claim group is underlain by Cambrian carbonates and fine grained clastics Ordovician limestone and the Ordovician - Silurian Road River Formation. These rocks have been intruded by quartz monzonite stocks and quartz latite and aplitic dykes. The ore limestone, a particularly pure carbonate member of Lower Cambrian age, undergoes a rapid change in thickness across the Flat River Valley from over 100 feet in the southwest to a few feet in the northwest. A quartz monzonite intrusion with a weakly developed metamorphic aureole outcrops in the northwestern portion of the claims.

CURRENT WORK AND RESULTS
The claims were geologically mapped at a scale of one inch to 1,000 feet and one hole was drilled to test the down dip extension of the ore limestone.

KAREN CLAIMS
Canada Tungsten Mining Corporation Ltd.,
142, Lonsdale Avenue,
North Vancouver, B.C.

Lead, Zinc, Antimony
105 I/15
62°58'N, 128°40'W

REFERENCE
Green *et al.*, (1968)

PROPERTY
KAREN 1-107

LOCATION
The claims are 12.5 miles east-southeast of O'Grady Lake and 75 miles northerly of Tungsten.

HISTORY
KAREN 1-107 were staked in 1974 to cover gossans found by prospector J.C. Turner.

DESCRIPTION
Carbonates and clastics of Upper Cambrian to Devonian age underly the claims. The Cretaceous O'Grady granitic stock intruded these sediments producing a series of schistose rocks and sulphide-bearing skarns. The stock underlies the eastern part of the claims and has altered the Ordovician-Silurian carbonates to marble and skarn.

Minor copper, zinc, tin and antimony are associated with pyrite-pyrrhotite bearing skarns especially at the intersection of faults and fractures. The sulphides form narrow pods and lenses. Evidence from the trenching of four of the skarns suggests a zone of secondary enrichment at the surface. The granite appears to be the source of the sulphur and metals.

CURRENT WORK AND RESULTS
The claims were mapped at 1:12,000 and numerous skarn zones found by prospecting were sampled. Several trenches were blasted on some of the larger skarns and sampled. Although galena, sphalerite, stibnite and cassiterite were found, the showings are too small and low grade to be of much economic potential.

KEN CLAIMS
Tyee Lake Resources Ltd.,
Suite 1930,
1056, West Hastings Street,
Vancouver, B.C.

Tungsten
105 O/8
65°15'N, 130°08'W

Titan Polaris Mines Ltd.,
Suite 703,
535, Thurlow Street,
Vancouver, B.C.

REFERENCE
Blusson (1971).

PROPERTY
KEN 2, 31-52 and 60.

LOCATION
The KEN claims are 7 miles north of the Canol Road and 10 miles east of MacMillan Pass. The Canol Road is well maintained to Ross River, approximately 143 miles to the west. A gravel airstrip at MacMillan Pass is suitable for fixed-wing aircraft.

HISTORY

The claims were staked in 1973, and optioned by Canada Tungsten Mining Corporation in 1975.

DESCRIPTION

The claims are near the eastern boundary of the Selwyn Mountains and cover part of a northwest trending belt of Helikian to Mississippian clastics and carbonates which have been intruded by Cretaceous quartz monzonite stocks.

Most of the claims are underlain by argillites, shales and limestones of the Road River Formation intruded in the southwest by quartz monzonite. The argillites at the contact of the intrusion have been hornfelsed.

CURRENT WORK AND RESULTS

The claims underlain by the Road River Formation, which hosts the nearby MacTung deposit, were explored by geological mapping, prospecting, geophysics, and geochemistry. Several targets outlined by these techniques, mainly in 1974, were diamond drilled in 1975.

MACTUNG DEPOSIT	Tungsten
Amax Northwest Mining Co. Ltd.,	105 O/8
601-535, Thurlow Street,	63°17'N, 130°07'W
Vancouver, B.C.	

REFERENCES

Blusson (1971); Padgham *et al.*, (1976).

PROPERTY

BORDER 11; GUM 1-8; GUT 1-24; PIX 1-30; PUP 1-14

LOCATION

The property straddles the Yukon-Northwest Territories border 7 miles north of the Canol Road at MacMillan Pass. Access to the claims is by road from Ross River 130 miles to the southwest, or from an airstrip at MacMillan Pass.

HISTORY

Scheelite showings discovered in 1963 by J.F. Allan and staked by Southwest Potash Corporation, a subsidiary of American Metal Climax Incorporated were transferred to Amax Exploration Inc. in March, 1967. Amax Exploration changed its name to Amax Potash in 1971 and in 1972 transferred the claims to Amax Northwest. Mining lease 2605, Lot 166 covers 1,423 acres of the property.

Surface sampling and mapping were undertaken in 1963 and 1964, followed by almost 35,000 feet of diamond drilling in 1968, 1971 and 1972. At the end of 1972, Amax published ore reserves of 30 million tons of 0.9% WO_3.

DESCRIPTION

The property is underlain by fine-grained clastics and to a lesser extent carbonates of the Ordovician-Silurian Road River Formation. Scheelite, pyrrhotite and minor chalcopyrite occur in several pyroxene garnet skarns developed from carbonates of the Road River Formation during intrusion of quartz monzonite stocks. The exact age of the carbonates is uncertain although Ordovician tribolites have been found a hundred feet stratigraphically above the deposit.

CURRENT WORK AND RESULTS

A topographical survey of the property and a construction site were prepared in 1975.

Lead Zinc in Shales

After the initial rush to acquire ground in the wake of Canex Placer's discovery in the Howard's Pass area in 1972, exploration for lead-zinc in the Road River shales gradually waned in 1975. Disillusioned by the style and nature of the lead-zinc mineralization in the carbonates, some companies are showing renewed interest in the shales of the Selwyn Basin and it is expected that exploration on these shales will increase in 1976.

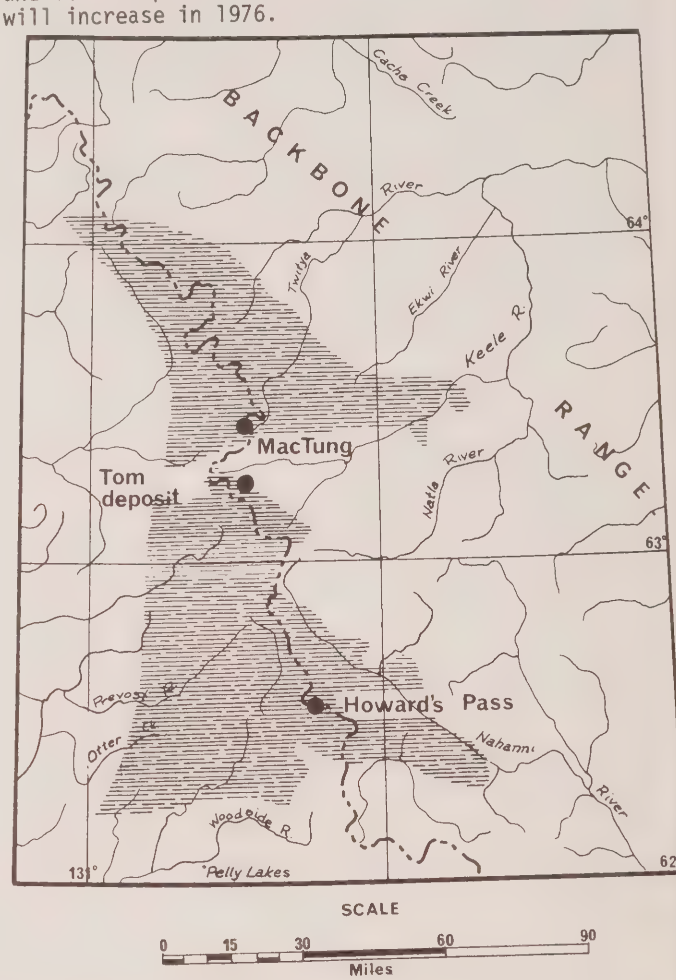


Figure VI-7: Map illustrating distribution of Road River and Besa River Shales.

The shales of the Selwyn Basin (Fig. VI-7) which host two major lead-zinc deposits; Canex Placer's at Howard's Pass and Hudson Bay's Tom at MacMillan Pass, consist of mudstones, calcareous limey mudstones, chert, siltstones and shales. Locally these rocks have been metamorphosed to argillites. The shales may be divided into two economically important formations, the Ordo-Silurian Road River Formation and the Devonian Besa River Formation. The Road River Shales are a rather monotonous basinal sequence of mudstones, calcareous siltstones and shales deposited under euxinic conditions. Lead-zinc occurs in relatively shallow spoon-shaped sub-basins developed on the platform to basin slope. A syngenetic to early

diagenetic origin for the mineralization is postulated for these deposits. Canex Placer's Howard's Pass deposit is perhaps the best known example of this type.

The Devonian Besa River shales are a series of turbidites enclosing massive barite layers, barite-rich shales and, possibly, volcanoclastics. They indicate a marked change from slow accumulation of material, under euxinic condition in the Ordo-Silurian, to more rapid deposition of material by turbidity action in the Devonian. The Tom deposit is associated with massive barite layers and appears to have been deposited in a fault-controlled linear trough. The author believes the mineralising fluids had a deep seated source and formed under conditions similar to those prevailing today in the Red Sea Deeps.

Y CLAIMS	
Placer Development Ltd.,	Lead-Zinc
700, 1030 West Georgia Street,	106 I/6
Vancouver, B.C.	62°28'N, 129°10'W

REFERENCES
Green *et al.*, (1968); Padgham *et al.*, (1976).

PROPERTY
Y 6-24, 27-30, 35-50, 60, 62-79, 88-113 and 122-162.

LOCATION
The 125 Y claims straddle the N.W.T.-Yukon border 125 miles north of Watson Lake. A 40-mile long winter road built in 1972-73 from near the end of the Tungsten Highway to Placer Development Ltd. is passable only to tracked vehicles, but is being replaced in 1977 by an all-weather road.

HISTORY
The Y claims were staked during the summer of 1972 to cover a large geochemical anomaly outlined by Placer's regional exploration. In April, 1975 U.S. Steel began to contribute exploration funds with Placer continuing as manager.

DESCRIPTION
Howard's Pass lies within the Selwyn Mountains which consist of a sequence of northwesterly striking Proterozoic and Paleozoic sediments intruded by Cretaceous quartz monzonite and granitic stocks. The sediments have been folded about northwesterly trending axes into a series of anticlines and synclines that have been cut by northwesterly and northeasterly striking thrust faults.

The main mineralized zone is on the southwesterly-facing slope of a rounded, northwesterly trending overburden-covered ridge. Trenches bulldozed across the face of the hill have exposed deeply-weathered black graptolitic 'shale'. Such trench exposures are not reliable sources of structural information because of the varying effects of soil creep and solifluction on the hillside. As a result of deep weathering, the mineralized areas are marked only by a faint rusty gossan or locally by small amounts of secondary mineralization such as hydrozincite or smithsonite-cerussite.

The host rock, a black graptolitic, pyritic shale is now considered to be a mudstone by company geologists. Calcareous lenses of black, coarsely recrystallized limestone within the mudstone are a few feet thick and probably less than 100 feet long. The mudstone also contains calcareous pyritic nodules as large as basketballs. The pyrite in these nodules is well banded and interlayered with mudstone which may indicate a biogenic origin. Beneath the host rock lies thin wisps or layers of mudstone less than two inches thick. Apparently the mineralized area lies in Road River shale which, together with underlying banded limestone, form part of the southwest limb of a syncline. The host rock strikes to the northwest and was thought to dip steeply to the northeast but more detailed work indicates the structure is much more complex.

CURRENT WORK AND RESULTS
Eighty-four holes, totalling 53,500 feet, have been drilled on the mineralized zone. Placer announced that the typical values are in the range of 6 to 12% combined lead-zinc. However, in following the trend of better mineralization, two holes, 1,000 feet apart along strike, intersected values considerably higher. Hole number 66 intersected 35 feet of 16.07% lead and 19.96% zinc. Hole number 80 intersected 25 feet of 23.09% lead and 24.99% zinc. These intersections, which are believed to approximate true thickness, are at a depth of 795 and 1,080 feet respectively and are at the down dip end of the drilling pattern. The drilling pattern is apparently too widespread to establish continuity of grade or calculate tonnages.

Perry River Nickel Mines Ltd.,	Lead/Zinc
5, 932-12th Avenue S.W.,	105 I/7
Calgary, Alberta.	62°18'N, 129°00'W

REFERENCE
Green *et al.*, (1968).

PROPERTY
126 ALPHA, BRAVO, CHAR and ECHO claims.

LOCATION
The property is 35 miles northwest of Tungsten and 12 miles north of Howard's Pass.

HISTORY
The claim group was staked by C. Turner in 1973 and is owned jointly by Perry River Nickel Mines and Golden Ram Resources of Calgary. Imperial Oil optioned the property in 1974.

DESCRIPTION
The property is underlain by shales and carbonates of Cambrian to Ordovician age predominantly the Road River Formation, which is locally hornfelsed. It outcrops only in the banks of several small streams.

Lead-zinc mineralization, found in a reddish-brown-weathering carbonate member is in high grade veinlets and disseminations in a well developed fracture zone. Limonite staining is prominent in the mineralized areas.

CURRENT WORK AND RESULTS
Geochemistry, geophysics, mapping, prospecting and diamond drilling were completed on the claims.

Carbonate-Hosted Zinc-Lead Occurrences

Carbonate-hosted zinc-lead deposits were most actively sought during 1975 but interest and enthusiasm declined towards the end of the summer mainly because the deposits found to date are mostly small, high grade, erratic and structurally-controlled. Several companies moved their camps to the N.W.T.-Yukon border area to gain a regional understanding of the Selwyn Basin shales in readiness for the 1976 field season.

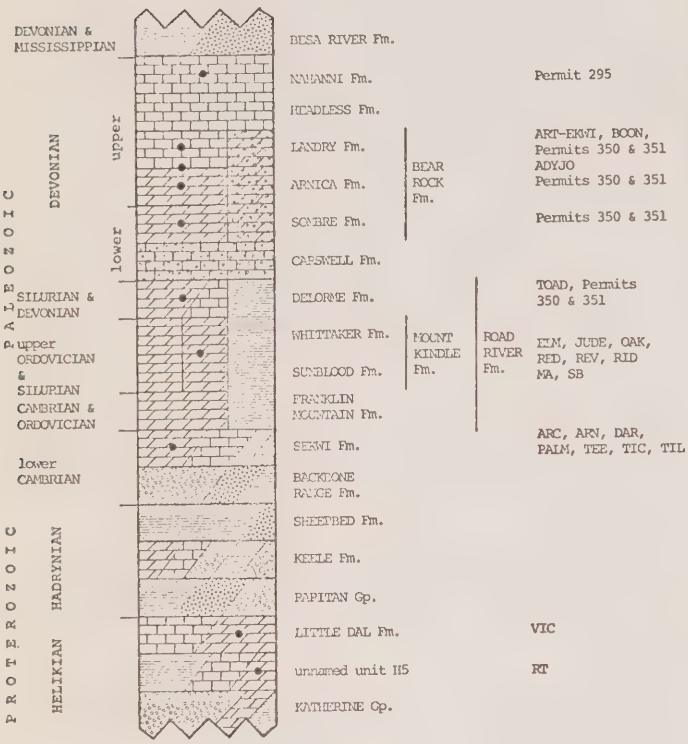


Figure VI-8: Distribution of zinc-lead properties throughout the stratigraphic column

The main stratigraphic units explored were the Helikian Little Dal Formation around the Gayna River area; the Lower Cambrian Sekwi Formation; the Upper Ordovician-Silurian Mt. Kindle, Whittaker and Sunblood Formations and the Devonian Landry and Bear Rock Formations. In the Mackenzie Mountains zinc-lead deposits range in age from Proterozoic to Devonian and although in part structurally-controlled, particularly in the Lower Cambrian strata, show many features similar to those of the Mississippi Valley type deposits of the United States. That is they have simple mineralogy, low precious metal content, occur in limestone or dolostone, are deposited at shallow depth, show evidence of solution activity and appear to be related to positive structures in areas devoid of igneous rocks (Ohle, 1959).

Figure VI-9: Fragments of a solution collapse breccia trimmed with dolospar and matrix infilled with dolomite, fine grained quartz crystals and pyrobitumen.

However, in the Mackenzie Mountains deposits typically are high grade veinlets showing erratic distribution and usually low tonnage potential, suggesting that many of the deposits that have been termed Mississippi Valley type are in fact related to the tectonics produced by one or more of the orogenies that have affected these rocks.

Many of the small structurally-controlled deposits were found after and during 1972-73 in platform carbonates which show none of the diagenetic overprint typical of the Pine Point of Mississippi Valley environments. The eastern edge of the Selwyn Basin where carbonates and shales interfingered and ecological reefs were developed and around the southwestern edge of the Mackenzie Arch, particularly in the Ordovician-Silurian and Devonian rocks, may offer more potential than the sub-supratidal cyclic carbonates of the Lower Cambrian Sekwi Formation.

Figure VI-10: Massive calcite 'caps' overlying solution collapse breccia

Figure VI-11: Original fabric of limestone completely destroyed by influx of course dolomite. Cavities infilled with quartz and pyrobitumen.

SB CLAIMS
Cominco Ltd.,
200, Granville Square,
Vancouver, B.C.

Zinc/Lead
95 L/1
62°15'N, 126°20'W

REFERENCE
Gabrielse *et al.*, (1973)

PROPERTY
SB 1-23

LOCATION
The claims are near the headwaters of the North Nahanni River, 20 miles west of Bell Heather Lake.

HISTORY
SB 1-23 were staked in 1974.

DESCRIPTION
SB 1-23 are underlain by Ordovician-Silurian carbonates and clastics deposited along the southwest margin of the Mackenzie Arch (Gabrielse *et al.*, 1973). A major northwest trending fault has thrust the Whittaker carbonates over carbonates of the Sunblood Formation. Fine grained dark metallic grey botryoidal sphalerite and minor galena occur in a quartz-calcite-dolomite annealed breccia of the Sunblood Formation. Hydrozincite and smithzonite are common secondary oxidation products. The mineralized breccia is up to 6 feet thick and may extend for 1,000 feet. Finely banded and apparently bedded galena and sphalerite have been found in talus but not in outcrop.

CURRENT WORK AND RESULTS
The claims have been mapped and prospected in detail. Diamond drilling totalling 3,570 feet apparently gave encouraging results.

MA CLAIMS
Cominco Ltd.,
200, Granville Square,
Vancouver, B.C.

Zinc/Lead
95 L/3
62°05'N, 127°10'W

REFERENCE
Gabrielse *et al.*, (1973).

PROPERTY
MA 1-176

LOCATION
MA 1-176 are 15 miles east of Glacier Lake. The southern boundary of the group is 2 miles north of the Nahanni National Park.

HISTORY
The MA claims were staked in 1974.

DESCRIPTION
Fine grained black clastics of the Road River Formation and limestones and dolostones of the Sunblood Formation underlie the claims.

Figure VI-12: Karsting in the Bear Rock Breccia Carcajou Lake, N.W.T.

CURRENT WORK AND RESULTS

A geochemical survey outlined several zinc anomalies in the Sunblood Formation. Minor amounts of sphalerite, found while trenching these areas, is believed to adequately explain these anomalies.

PROSPECTING PERMITS 350 AND 351
Cominco Ltd.,
200, Granville Square,
Vancouver, B.C.

Zinc, Lead, Copper
95 L/1, 95 L/8
62°00'N, 126°00'W

REFERENCE

Gabrielse *et al.*, (1973)

PROPERTY

Prospecting Permit 350	95 L/1
Prospecting Permit 351	95 L/8

LOCATION

The prospecting permits cover the southern part of the Thundercloud Range and straddle the North Nahanni River and Clearwater Creek 5 miles to the east.

HISTORY

Prospecting permits 350 and 351 were acquired in 1975 by Cominco Ltd.

DESCRIPTION

The prospecting permits are underlain predominantly by carbonates of Middle Devonian age. Minor amounts of carbonates and clastics of Helikian to Cambrian age outcrop in the northwest portion of Prospecting Permit 350.

CURRENT WORK AND RESULTS

The objective was to study the Middle Ordovician to Devonian carbonate strata in the areas of zinc-lead showings and find by extrapolation additional areas which might contain zinc and lead. Middle Devonian collapse breccias in the Manetoe Formation were examined. Zinc, lead and copper were found in a number of places but the majority of showings are small high grade erratic deposits with little continuity.

ADYJO CLAIMS
Cominco Ltd.,
200, Granville Square,
Vancouver, B.C.

Zinc, Lead, Copper
95 M/7
63°17'N, 126°57'W

REFERENCE

Gabrielse (1973)

PROPERTY

ADYJO 1-15

LOCATION

The claims are north of the Redstone River, 105 miles west of Wrigley, N.W.T.

HISTORY

ADYJO 1-15 were staked by Cominco in 1975.

DESCRIPTION

A thin sequence of Devonian limestones and dolostones of the Landry and Arnica Formations underlie the claims. There is an apparent unconformity between the two formations and it is in this zone that most of the zinc-lead-copper has been found. The unconformity is represented by brecciated, and fractured coarse granular dolomite and calcite with silicification and pyrobitumen. The brecciation and fracturing occurs in lenticular zones of small dimensions.

The sulphides fill openings including vertical fractures in the breccia pods.

CURRENT WORK AND RESULTS

The claims were mapped at a scale of one inch to one half mile and prospected in detail.

BOON CLAIMS
Welcome North Mines Ltd.,
301, 1035 West Pender Street,
Vancouver, B.C.

Zinc/Lead/Copper
95 M/7
63°26'N, 120°45'W

REFERENCE
Gabrielse (1973)

PROPERTY
BOON 1-6

LOCATION
BOON 1-6 straddle a north flowing tributary of the upper North Redstone River 66 miles east of Godlin Lakes. Godlin Lakes is suitable for most float-equipped aircraft.

HISTORY
BOON 1-6 were staked in 1974 after sphalerite and galena had been found by prospector P. Risby.

DESCRIPTION
BOON 1-6 are mainly overburden covered and apparently underlain by Devonian carbonate rocks. The Mid-Devonian Landry Formation is the host rock for the zinc-lead mineralization. Semi-massive, dark brown, fine-grained sphalerite covers an area approximately four feet by eighteen feet in a dark grey dolostone.

There is a bright orange brown gossan and an area of float with sphalerite, galena and minor chalcopyrite, within two hundred feet of the sphalerite deposit.

CURRENT WORK AND RESULTS
The claims have been mapped and prospected and a small area adjacent to the mineralization tested by geochemical survey.

PROSPECTING PERMIT 295
Giant Yellowknife Mines Ltd.,
P.O. Box 40,
Commerce Court West,
Toronto, Ontario.

Zinc/Lead
96 O/6
63°20'N, 123°35'W

REFERENCE
Douglas and Norris, (1961b).

PROPERTY
Prospecting Permit 295.

LOCATION
The area straddles the Mackenzie River just north of the village of Fort Wrigley where there is a 4,200 foot airstrip.

HISTORY
Prospecting Permit 295 was acquired in 1973 after the discovery of zinc-lead just to the south. Copper had been reported at Mount Cap which is located within the permit area (Douglas and Norris, 1963).

DESCRIPTION
Upper Devonian shale, sandstone and minor limestone (units 23, 24 and 25 respectively, Douglas and Norris, 1963), underlie most of the west half of the permit area. A north-striking thrust fault in the centre of the area has upfaulted and exposed a unit of Middle Devonian Nahanni Formation limestone and Bear Rock Formation brecciated dolomite (units 21 and 26, ibid.). The eastern part of the area is underlain by northwest-striking shale, limestone and dolomite and sandstone ranging in age from Middle Devonian to the west to Proterozoic to the east. Upper Devonian and Cretaceous shale (units 23 and 27, ibid.) are exposed east of a thrust fault near the border of the permit area.

CURRENT WORK AND RESULTS
Drilling begun in 1974 was resumed in 1975. At least 3 diamond drill holes tested anomalies previously outlined by geochemical and geophysical surveys. The first two holes were drilled in shale. The third hole was drilled to test a brecciated dolostone which at surface contained minor sphalerite and hydrozincite. The permits expired in 1976 and no claims had been staked.

DAR CLAIMS
Amax Exploration Ltd.,
535, Thurlow Street,
Vancouver, B.C.

Zinc/Lead/Copper
105 P/8
63°23'N, 128°21'W

REFERENCE
Blusson (1974).

PROPERTY
DAR 1-28

LOCATION
The DAR claims are in the Backbone Ranges of the Mackenzie Mountains south of Sekwi Brook and north of the Natla River, 155 miles northeast of Ross River.

HISTORY
The claims were staked in 1974 to cover zinc-lead mineralization in a Lower Cambrian dolostone.

DESCRIPTION
The property is underlain by Upper Proterozoic to Lower Cambrian clastics and carbonates of the Backbone Range and Sekwi Formation. A large part of the Lower Cambrian Sekwi Formation, the host for the mineralization, has been faulted out in this area.

Galena, sphalerite and tetrahedrite is associated with a small dolostone mound between thin-bedded shales and carbonates of the Sekwi Formation and the massive shallow water quartzites of the Backbone Ranges Formation. Stratabound sulphides occur in crackle breccias, fractures and solution breccias. The fracture fillings are spectacular high grade showings with small tonnage potential, but the breccia mineralization can be extensive and significant.

The sulphides are exposed on a dip slope outcrop, thus the nature and style of the mineralization is not obvious.

CURRENT WORK AND RESULTS
The claims have been mapped and prospected in detail.

ARN, TEE GROUPS
Bethlehem Copper Corporation,
2100, Guiness Tower,
Vancouver, B.C.

Zinc, Lead
105 P/11, 14
63°45'N, 129°17'W

REFERENCE
Blusson (1971).

PROPERTY
ARN 1-82, TEE 1-77.

LOCATION
The ARN and TEE claims are 16 miles west of Godlin Lakes. The Canol road is within 7 miles of the southern claim boundary.

HISTORY
The claims were staked in 1973 by Welcome North Mines during regional exploration of the Sekwi Formation for zinc and lead. Bethlehem Copper Corporation optioned the claims in late 1973. In 1974 prospecting, geochemical and geological surveys and diamond drilling explored the showings.

DESCRIPTION
The claim groups are underlain by Cambrian to Devonian carbonates and clastics. Sulphides occur in the Lower Cambrian and Sekwi Formation which outcrops over a large portion of the claims and consists of carbonates deposited under high energy conditions in the intertidal zone. Overlying the Sekwi, and possibly in fault contact with it, are black mudstones and shales of the Road River Formation. Prospecting and diamond drilling outlined sporadic low-grade lead-zinc mineralization over a strike length of several miles. Galena and minor sphalerite occur throughout an orange-weathering vuggy dolostone near the top of the Sekwi Formation. The sulphides are more common in three more porous beds within this member. Grade is generally about one per cent.

CURRENT WORK AND RESULTS
In 1975 one 225-foot diamond drill hole further tested the mineralization but assays of only one to two per cent combined lead-zinc were obtained.

ART AND EKWI CLAIMS
Malabar Silver Mines Ltd.,
404-850 West Hastings Street,
Vancouver, B.C.

Zinc, Lead
105 P/14
63°51'N, 129°10'W

REFERENCE
Blusson (1974).

PROPERTY
ART 1-15; EKWI 1-36

LOCATION
The claims are 13 miles west-northwest of Godlin Lakes.

HISTORY
The ART group was staked by P. Risby in 1972 and transferred to Welcome North Mines in the spring of 1973. The EKWI claims were staked in February, 1973 around the ART claims to cover possible extensions of the mineralization. Welcome North Mines optioned the ART and EKWI groups to Conwest Exploration in June, 1973; and Conwest transferred the option in September, 1973 to Malabar Silver Mines Ltd.

DESCRIPTION
The ART-EKWI claims are underlain by Devonian limestone, dolostone and shale, Arnica Formation dolostone, Landry Formation limestone, Headless Formation limestone and Nahanni Formation limestone. These formations form part of a broad northwest-trending syncline on the northeast side of a thrust fault dipping steeply east and trending northwest across the property (Blusson, 1973). To the southwest, Headless Formation limestone, Nahanni Formation limestone and Devonian shale have been faulted by a branch of the main thrust fault. On the northwest side of the property, these formations have been folded into an overturned anticline.

Showings in the Landry Formation 500 to 1,000 feet east of the major thrust fault are believed to be controlled by a high-angle branch fault of the main thrust. Number 1 showing consists of smithsonite and minor galena in scree. Numbers 2, 3 and 4 showings contain galena and sphalerite which, with calcite, have filled solution-enlarged fractures near the base of the Landry Formation. Minor amounts of smithsonite and cerussite are also present.

CURRENT WORK AND RESULTS
Prospecting, trenching, chip sampling, geochemical sampling and geological mapping explored the ART-EKWI group. Two trenches which failed to reach bedrock were blasted on the Number 1 showing and encountered abundant pieces of smithsonite containing minor galena. Samples of the scree slope fines contained up to 12,000 ppm lead and 41,500 ppm zinc. Malabar Silver Mines tested the showings with four diamond drill holes.

REV CLAIMS
Welcome North Mines Ltd.,
1027, 470 Granville Street,
Vancouver, B.C.

Zinc, Lead
106 A/3
64°08'N, 129°20'W

REFERENCE
Blusson (1974).

PROPERTY
REV 1-105

LOCATION
The claims are on the north side of the Twitya River, 25 miles northwest of the Canol Road and approximately 110 miles west of Norman Wells. Rev Lake, 15 miles to the west, is suitable for STOL aircraft.

HISTORY
Zinc-lead showings were discovered by prospector P. Risby and geologist M. McArthur in May, 1975 and the 105 REV claims were staked later in the summer.

DESCRIPTION
Bedrock on the claims is Ordovician-Silurian Mt. Kindle Formation, a dark grey, thick-bedded dolostone which rests on and is conformably overlain by Upper Cambrian-Ordovician carbonates and clastics. The Mt. Kindle Formation, host to the mineralization, is roughly 1,500 feet thick on the claims and consists of carbonates probably deposited in a variety of environments ranging from supratidal to lagoonal to fetid open marine platform (McArthur, 1975). Several sets of faults which cut the host rocks appear to have controlled the deposition of the sulphides in

some of the showings.

The zinc sulphides occur in a variety of styles and may be white or green or red; the different colours perhaps reflecting variations in the metal to sulphur ratio and in the degree of remobilization. The sulphides form veins, infill vugs and hair line fractures and cement crackle zones and breccias associated with several of the faults although not all fault zones are mineralized. Deposition of disseminated sphalerite in dolostone of possible intratidal origin appears to be controlled by the chemistry of the host rock rather than by structural features. The ratio of sphalerite to galena is 5:1 and associated minerals are minor tetrahedrite calcite quartz, white sparry dolomite and native sulphur. Of the ten showings only the Main and Big Cirque showings have been drilled. The mineralization at the Main Showing appears related to several sets of faults and their associated crackle zones and breccias, although there is some sphalerite as vug infillings and disseminations. The mineralization is exposed over an area 300 by 450 feet. The Big Cirque mineralization appears as fillings in crackle zones as veins and disseminations and can be traced in talus over several thousand feet from a fault which has affected the Mt. Kindle and Delorme Formations.

CURRENT WORK AND RESULTS

The claims were prospected, sampled, geologically mapped and tested by 353 feet of drilling in 7 holes on the main showing and 278 feet of drilling in 4 holes on the Big Cirque showing.

ELM, JUDE AND OAK CLAIMS	Zinc, Lead
Harmon Management,	106 A/5
610-850 West Hastings Street,	64°22'N, 129°50'W
Vancouver, B.C.	

REFERENCE

Blusson (1974).

PROPERTY

ELM 1-7; JUDE 1-23; OAK 1-4.

LOCATION

The ELM and OAK claims are 9 miles and the JUDE claims 11 miles southwest of Palmer Lake.

HISTORY

The claims were staked in August, 1975 to cover zinc showings found by prospectors E. Debock and J. Cohen.

DESCRIPTION

Carbonates of the Ordovician-Silurian Mt. Kindle Formation, dolostones of the overlying Delorme Formation and carbonates and clastics of the underlying Lower Cambrian Sekwi and Franklin Mountain Formations underlie the claim groups. Zinc and lead sulphides are confined to the thick- and thin-bedded limestones and dolostones of the Mt. Kindle Formation which contain massive reefoid structures in the vicinity of the claims.

On the OAK claims red and green sphalerite has filled vugs in a thick porous dolostone unit. Sphalerite, associated with calcite, is also found in a five- to ten-foot thick brecciated dolostone.

On the ELM claims a brecciated carbonate mound about 50 by 200 feet hosts red and green sphalerite in a calcite or dolomite matrix. The sphalerite coats large fossils and brecciated fragments. Secondary zinc minerals impart a whitish mottled appearance to the outcrops. On the JUDE claims sphalerite and coarse crystalline calcite fill the interstices of a thick brecciated dolostone within a carbonate mound. Brecciation of the dolomite and the mound could be formational or tectonic. A dolostone underlying the breccia contains finely disseminated red sphalerite suggesting a different control of mineralization.

CURRENT WORK AND RESULTS

Talus slopes were prospected on the OAK and ELM claims and the valley bottoms prospected on the JUDE claims. Little is known of the grade or extent of the mineralization.

PALM CLAIMS	Zinc/Lead
Harmon Management Ltd.,	106 A/5
907-675 West Hastings Street,	64°24'N, 129°48'W
Vancouver, B.C.	

REFERENCE

Blusson (1974).

PROPERTY

PALM 1-124

LOCATION

The claim group lies seven miles southwest of Palmer Lake.

HISTORY

The claims were staked in July, 1975 to cover zinc-lead showings found during prospecting of the Sekwi Formation.

DESCRIPTION

PALM 1-124 are underlain by coarse clastics of the Backbone Range Formation, shallow marine carbonates of the Sekwi Formation and unit EOE (Blusson, 1973). Lead-zinc is found in the Lower Cambrian Sekwi Formation which, in this locale, consists of a thick sequence of carbonates deposited in tidal to supratidal zones similar to a modern day sabkha.

Two main showings have been outlined. The West showing consists of high-grade anastomosing veinlets of sphalerite and galena in a calcite gangue. The veinlets which lack preferred orientation and crosscut a massive grey dolostone, range from hair-line fractures to several feet in thickness and extend discontinuously along strike for 600 feet. The sulphides in the Waterfall showing and its northwest and southeast extensions are apparently related to a thick-bedded finely crystalline vuggy dolostone which becomes more argillaceous to the northwest. Sphalerite and minor galena infill vugs and cavities and replace minor bedding planes discontinuously over a strike length of 7,000 feet. Pyrite, quartz and calcite are commonly associated gangue minerals and infill many of the vugs. Several deformed zones show extreme secondary enrichment but grade ranges from 1 to 10% and overall averages about 2% combined lead-zinc.

CURRENT WORK AND RESULTS

The claims have been prospected and some of the mineralized areas have been mapped in detail.

VIC CLAIMS — Zinc/Lead
Harmon Management, — 106 A/7
610, 850 West Hastings Street, — 64°17'N, 128°37'W
Vancouver, B.C.

REFERENCE
Blusson (1974).

PROPERTY
VIC 1-27

LOCATION
The claims are 15 miles northwest of the junction of the Twitya and Keele Rivers. A small lake, 25 miles to the west is suitable for STOL aircraft.

HISTORY
VIC 1-27 were staked on June 26, 1975 to cover zinc mineralization discovered in the Helikian Little Dal Formation by prospector Vic Guinet.

DESCRIPTION
The claims are underlain by the Helikian carbonates and red beds of Unit H5g and carbonates of the Little Dal Formation, and by the Cambrian to Ordovician carbonates, clastics and red beds of the Franklin Mountain Formation which unconformably overlie the Little Dal Formation (Blusson, 1973). Mapping was done by studying the talus slope material.

Numerous lead and zinc boulder trains were found. Disseminated galena and sphalerite, with or without barite infill vugs and cement breccias in a crystalline buff-weathering dolostone member of the Little Dal Formation. Although the several float trains are widespread, it appears from a study of talus slope material that they are related to the same stratum of dolostone which may be continuous over a strike length of 2,000 feet.

CURRENT WORK AND RESULTS
The claims have been only superficially prospected.

TOAD CLAIMS — Zinc/Lead
Harmon Management, — 106 A/7
907, 675 West Hastings Street, — 64°20'N, 128°45'W
Vancouver, B.C.

REFERENCE
Aitken and Cooke (1974).

PROPERTY
TOAD 1-18

LOCATION
TOAD 1-18 are 20 miles northwest of the junction of the Twitya and Keele Rivers and 198 miles northeast of Ross River, Y.T. A small lake, suitable for STOL aircraft lies three miles southeast of the property.

HISTORY
The claims were staked in July, 1975 to cover zinc, lead and copper showings found by prospectors Percy Risby, Doug Fulcher and Neil Debock.

DESCRIPTION
TOAD 1-18 are underlain by shallow-water carbonates and clastics of Helikian to Devonian age that were deposited in a shelf environment along the northeastern flank of the Selwyn Basin. Shales and green siltstones of the Upper Rapitan Group are unconformably overlain by light grey weathering drusy dolostones of the Upper Silurian-Devonian Delorme Formation. Well-bedded dolostones of the Devonian Bear Rock Formation overlie the Delorme Formation. This unit is sporadically mineralized over 4,500 feet. A second unit, in the Delorme Formation, hosts more extensive showings of chalcocite, sphalerite and galena over a strike length of approximately 3,000 feet.

CURRENT WORK AND RESULTS
The claims were mapped at a scale of one inch to 1,000 feet and prospected. Because of weathering of the carbonates and sulphides, assay results may not be representative of the grade of mineralization and trenching and drilling to obtain fresh samples has been recommended.

RIO CLAIMS — Zinc, Lead
Harmon Management, — 106 B/1
609, 850 West Hastings Street, — 64°10'N, 130°22'W
Vancouver, B.C.

REFERENCE
Aitken *et al.*, (1974).

PROPERTY
RIO 1-59

LOCATION
The claims are 28 miles west of Misty Lake.

HISTORY
RIO 1-59 were staked in 1974.

DESCRIPTION
The RIO group is underlain primarily by a thick sequence of Ordovician-Devonian platform carbonates. These strata are underlain by the Mt. Kindle Formation, and are in contact with the black clastics of the Besa River Formation west of the property.

There are various types of sulphide showings, most of them sphalerite rich, on the claims. The Main showing consists of sparse pale yellow to amber sphalerite in vugs of several fossiferous limestone beds that are 300 to 400 feet stratigraphically below the contact with the Besa River shales. The contact showing consists of low grade lead and zinc mineralization along 2,000 feet of the contact between the platform carbonates and the Besa River shales. This extremely shattered contact could be a bedding-plane fault. Additional showings on the claim group are related to skeletal porosity in several limestone members and although extensive appear to be of low grade.

CURRENT WORK AND RESULTS
The claims have been prospected in detail and geologically mapped, and two holes totalling 188 feet were drilled on the Main Showing to test the down dip potential of the mineralized beds. The results of the drilling are considered inconclusive because of numerous faults and a high degree of leaching and oxidation.

RED CLAIMS
Serem Ltd.,
505, 850 West Hastings Street,
Vancouver, B.C.

Zinc, Lead
106 B/8
64°25'N, 130°08'W

REFERENCE
Blusson (1974).

PROPERTY
RED 1-286

LOCATION
The claims are located 16.5 miles west-southwest of Palmer Lake which is suitable for STOL aircraft operations.

HISTORY
The claims were staked in 1974.

DESCRIPTION
Lower Cambrian Sekwi Formation, Upper Ordovician-Silurian Mt. Kindle Formation and Devonian platform carbonates underlie the claims.

Mineralization is mainly restricted to lower and upper carbonate complexes of the Mt. Kindle Formation. Part of the lower complex is a paleographic high of strongly dolomitised small bioherms and biostromes, whereas the upper carbonate complex is a recrystallised dolostone with small bioherms and associated rubble breccias.

Sphalerite with minor galena, fluorite and pyrite occur as disseminations, vug infillings, stringers and occasionally as infillings of rubble breccias flanking the bioherms of both complexes.

The deposits are generally small rich pockets, with no evidence of lateral or vertical continuity.

CURRENT WORK AND RESULTS
The claims were geologically mapped, prospected and several showings were trenched.

TIC AND TIL CLAIMS
Serem Ltd.,
505, 850 West Hastings Street,
Vancouver, B.C.

Zinc, Lead
106 B/9
64°30'N, 130°06'W

REFERENCE
Blusson (1974).

PROPERTY
TIC 1-6, 77-106, 168-209; TIL 107-167.

LOCATION
The claim groups are located approximately 18 miles westerly of Palmer Lake which is suitable for STOL aircraft operations.

HISTORY
The claims were staked in 1974 to cover zinc-lead showings discovered during regional prospecting.

DESCRIPTION
Proterozoic to Devonian carbonates and clastics underlie the claims. The Lower Cambrian Sekwi Formation, the most interesting rocks on the property, host several different types of lead-zinc showings. The shallow-water marine sediments, predominantly carbonates, of the Sekwi Formation in this area were deposited in inter-tidal to supratidal zones (Krause, Chapter X of this report).

On the property, zinc-lead is present in collapse breccias and in a recrystallised dolostone. The origin of the breccias has not yet been determined, but they may be a result of solution collapse. They are up to 60 feet thick and consist of irregularly sized, randomly orientated fragments of dolostone in a bedded sedimentary matrix with sparry dolomite and pyrite. Pyrite with minor lead and zinc sulphides comprise up to 25% of the volume of these breccias.

The recrystallised dolostone which is stratigraphically above the breccias, contains sulphides in vugs and in open spaces. Sphalerite and galena are widespread and extensive but the metal content averages only 1% combined lead-zinc.

Lead-zinc sulphides present in other units on the property form small spectacular structurally controlled veins considered of no economic importance by company geologists.

CURRENT WORK AND RESULTS
The TIC claims were mapped, prospected and drilled. Three holes, a total of 1,983 feet, tested the nature and extent of the mineralization in the breccias. Permafrost hindered the drilling.

Detailed prospecting disclosed several zinc-lead showings on the TIL group.

ARC CLAIMS
Harmon Management,
907, 657 West Hastings Street,
Vancouver, B.C.

Zinc, Lead
106 B/12
64°35'N, 131°40'W

REFERENCE
Blusson (1974).

PROPERTY
ARC 1-122

LOCATION
ARC group is near the Yukon border, 150 miles westerly from Normal Wells.

HISTORY
The claims were staked in 1974 to cover zinc and lead showings.

DESCRIPTION
The ARC group is underlain by clastics and carbonates of the Lower Cambrian Sekwi Formation and the conformably overlying shales of the Road River Formation. These sediments form part of the north-eastern flank of the Selwyn Basin.

Zinc and lead were found in a 35 foot thick microcrystalline, in part oolitic, grey dolostone of the Sekwi Formation, about 600 feet below the contact with the Road River shales.

Deposits of calcite and sphalerite in shear and breccia zones grade as high as 25% Zn, but they have no vertical and horizontal continuity. The faults and shears have not been dated.

CURRENT WORK AND RESULTS
Prospecting and mapping of the property outlined numerous zinc-lead occurrences in situ and in float.

GAYNA RIVER PROJECT
Rio Tinto Canadian Explorations Limited,
615-2 Bentall Centre,
Vancouver, B.C.

Zinc, Lead
106 B/14,15; G/2,3
64°58'N, 130°22'W

REFERENCES
Aitken and Cook (1974); Aitken, MacQueen and Usher (1973); Hewton (1976).

PROPERTY
RT 1-898

LOCATION
The Rio Tinto camp is on the Gayna River, 166 miles west of Norman Wells. A short airstrip suitable for aircraft such as the Helio Couriers lies just east of the camp.

HISTORY
The claims were staked in 1974 by Cordilleran Engineering for Rio Tinto to cover mineralization found by prospecting and regional geochemical surveys of the H5 and Little Dal carbonates. By the end of 1975, 133 of the RT claims had lapsed.

DESCRIPTION
The claim block is mainly underlain by limestones, dolostones, and shales of the Helikian Map unit H5 (Aitken, MacQueen and Usher, 1973). The H5 unit is unconformably overlain by Upper Cambrian Franklin Mountain Formation red beds, and rests conformably on the Katherine quartzite (Fig. VI-13).

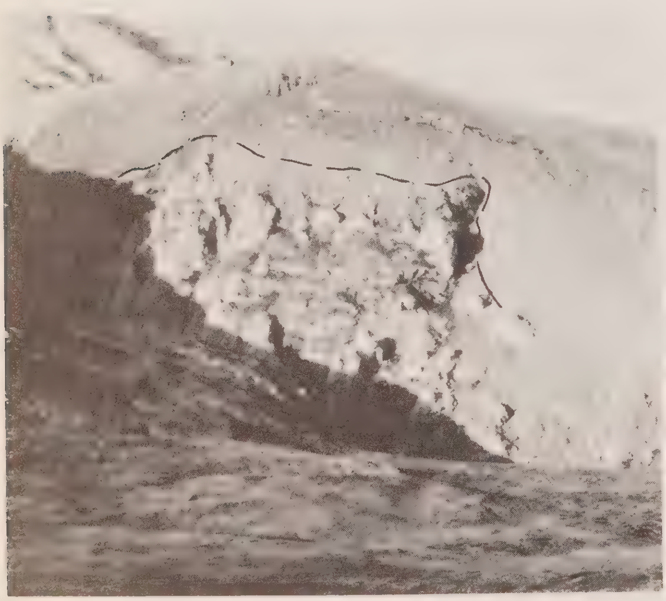


Figure VI-13: Stromatolitic reef at Gayna River, N.W.T. Note carbonate beds draping over reef.

Large stromatolitic algal bioherms are common in the lower H5 and form a discontinuous northwesterly trending zone of reefs. Unit H5 grades from deep water shales and minor carbonates, to shallow water lagoonal carbonates and evaporites. Sphalerite in various forms and colours is associated with a variety of features similar to those that host Mississippi Valley type deposits. The majority of the showings are in brecciated dolostone members of the H5. Sparsely mineralised large algal reefs are intimately associated with the sulphides which have been accumulated in primary breccias developed on the flanks of the reef and in solution collapse and crackle breccias.(Figs. VI-14, 15).

Figure VI-14: Solution collapse breccia, Gayna River, N.W.T. Note the fragments rimmed by dolospar are surrounded by second generation dolomite.

Figure VI-15: Paragenetic sequence at Gayna River, N.W.T., i.e. sphalerite, galena, dolospar.

The latter are the main sites of mineral deposition. The sphalerite may be pale green or orange-red and fills fractures or is present as disseminations and massive beds in structures produced either by tectonism or by karsting. Dolomite, calcite, pyrite, pyrobitumen and minor galena are associated with the sphalerite. Several periods of mineralization are indicated by brecciated fragments of sphalerite cemented by a later stage sphalerite (Hewton, 1976). The regional geological setting, style of mineralization and host structures indicate that the sulphides on the Gayna River property are Mississippi Valley type.

CURRENT WORK AND RESULTS

The claim group was thoroughly prospected during geological mapping and stratigraphic section work. Geochemical and IP surveys identified several anomalies. Results of diamond drilling on the A showing were encouraging.

Coal and Placer Gold

Exploration continued for coal in the Cretaceous sediments around Fort Norman and for placer gold in the gravels of the Flat River and its tributaries.

Seams of lignite outcropping in several places along the Mackenzie River appear to be associated with typical cyclothems.

Placer gold was found in gravels of the Flat River area but the grades are too low for even small scale mining.

COAL EXPLORATION LICENCES 21-24	Coal
Manalta Coal Ltd.,	96 C/14
P.O. Box 2880,	64°30' to 65°00'N
Calgary, Alberta.	125°00' to 125°30'W

REFERENCE

Aitken and Cook (1974); Padgham *et al.*, (1976)

PROPERTY

Coal Exploration Licences 21 to 24

LOCATION

The licenced area is 10 miles east of Fort Norman and 50 miles southeast of Norman Wells.

HISTORY

The licences were obtained by Manalta Coal Ltd. in 1974.

DESCRIPTION

The area is largely overburden covered, but extrapolation of the geology from the Carcajou Canyon area to the west (Aitken and Cook, 1974) suggest it is underlain by relatively flat-lying marine and non-marine sandstones, shales and minor coal of the Little Bear and East Fork Formations. Coal is visible along the banks of the Mackenzie River immediately east of Fort Norman and west of Seagull Island. On Seagull Island, lignite has been found in a 14-foot thick upper seam and a 4-foot thick lower seam.

CURRENT WORK AND RESULTS

A widely spaced grid of vertical holes have tested the coal licence area. Several of the 20 rotary holes intersected thick coal seams at shallow depths.

COAL EXPLORATION LICENCES 26-29	Coal
Luscar Ltd.,	95 C/5, C/12
8th Floor,	64°22' to 14°37'N
Royal Trust Tower,	125°30' to 126°00'W
Edmonton, Alberta.	

REFERENCE

Aitken and Cook (1974).

PROPERTY

Coal Exploration Licences 26 to 29.

LOCATION

The coal licences cover an area centred 30 miles south of Fort Norman. Lakes in the area provide local access for aircraft.

HISTORY

The licences were issued to Ponjo Petroleum in the spring of 1975 and subsequently obtained from that company by Luscar Ltd.

DESCRIPTION

Extrapolation of the geology from the Carcajou Canyon area to the west (Aitken and Cook, 1974) suggest the area is underlain by relatively flat lying marine and non-marine sandstones, shales and minor coal of the Upper Cretaceous Little Bear and East Fork Formations and by Eocene gravels, conglomerates, sandstones, minor coal and volcanic ash.

CURRENT WORK AND RESULTS

The area was geologically mapped and prospected, and stratigraphic sections were measured along the main creeks. At least seven seams of lignite, some of them as much as 20 feet thick, have been found on the property.

BRINKER, EPLER & WINDFALL CLAIMS	Gold
Nahanni Placers,	95 E/17, E/8
43, Westview Dr. S.W.,	61°22'N, 126°30'W
Calgary, Alberta.	

REFERENCE

Gabrielse (1967b, 1973); Green and Godwin (1963); Green and Roddick (1968).

PROPERTY

BRINKER; EPLER; WINDFALL.

LOCATION

The claims are located on three tributaries of the Flat River: WINDFALL on Bennett Creek, BRINKER on McLeod Creek, and EPLER on Grizzly Creek, 180 miles southwest of Fort Simpson. Seaplane Lake is about 4 miles northwest of the WINDFALL claim.

HISTORY

The placer gold claims were staked in May, 1974.

DESCRIPTION

Parts of the claims are underlain by gravel terraces produced by earlier stages of creek development. A little placer gold was recovered from this region by Clarke and Krause in 1934.

CURRENT WORK AND RESULTS

Test Pits dug in several areas on the claims confirmed the presence of well sorted sands and gravels. Trace amounts of flour gold were found in creeks draining the terraces and flats.

DEB
Canada Tungsten Mining Corporation,
142, Lonsdale Avenue,
North Vancouver, B.C.

Copper
95 D/15, E/2
61°00'N, 123°31'W

REFERENCE

Gabrielse and Blusson (1969); Gabrielse, Blusson and Roddick (1973).

PROPERTY

DEB 1-48

LOCATION

The claims are 20 miles southwest of Clarke Lake and 100 miles northeast of Watson Lake, Y.T.

HISTORY

DEB 1-48 were staked in the winter of 1974 to cover a series of mafic volcanics and sediments.

DESCRIPTION

The claims are underlain by volcanics, carbonates and clastics, ranging in age from proterozoic to Ordovician. This sequence has been folded into a series of open anticlines and syncline with which are associated minor thrust faults.

Copper has been found in the mafic volcanics and associated sediments as malachite and bornite in fine disseminations and in amygdules in the basaltic flows and in southeast trending fractures and along bedding plane cleavage in the underlying orthoquartzites and conglomerate. Thinly laminated green tuffs also contain finely disseminated copper minerals throughout and as paint-work along cleavage planes and fractures.

The assemblage of basalts, tuffs, quartzites and conglomerates suggests a near shore marine environment where the copper could have been leached from the volcanics and precipitated in the volcanoclastics. Later deformation could have mobilized the copper to mineralize the cleavage planes and fracture systems. This supracrustal sequence has been correlated with the Sekwi Formation and is probably time-equivalent to the shallow water intertidal carbonates and clastics to the north.

CURRENT WORK AND RESULTS

The results of geological mapping, prospecting and geochemical surveys over the property were not encouraging.

OPERATING MINES

E.J. Hurdle[1] and W.A. Gibbins[2]
D.I.A.N.D., Geology Office, Yellowknife

INTRODUCTION

In 1975, seven mines (Fig. 1), Con, Giant, Pine Point, Terra, Echo Bay, Cantung and Hope Bay operated in the Northwest Territories. Pine Point Mines Ltd. and Giant Yellowknife Mines Ltd. worked both open pits and underground.

Giant, Con, Echo Bay, Terra and Hope Bay Mines produce mainly precious metals from shear-zone and vein deposits in Precambrian volcanic rocks of the Slave and Bear Provinces. Giant and Con Mines were the main gold producers; Terra, the main silver producer.

Cantung Mine extracts tungsten and copper from skarns developed in Cambrian carbonates during the intrusion of a quartz monzonite in the Cretaceous.

Pine Point Mine produces lead, zinc and cadmium from stratabound orebodies within Paleozoic carbonates.

NANISIVIK MINE	Lead, Zinc
Nanisivik Mines Ltd.	48 C/1
Suite 100, 330 - 5th Ave. SW	73°02'N, 84°30'W
Calgary, Alberta.	
T2P OL4	

REFERENCES
Blackadar (1956, 1970); Blackadar *et al.*, (1968b); Clayton (1966); Geldsetzer (1973a, 1973b): Lemon and Blackadar (1963); Trettin (1969).

PROPERTY
354 claims

LOCATION
The property is on the south shore of Strathcona Sound, a fiord near the north end of Baffin Island. The deposit is immediately west of Kuhulu Lake and 17 miles east of the settlement of Arctic Bay.

HISTORY
A. English, a prospector with the Dominion Government Expedition (1910-1911) to the Arctic Islands under the direction of Captain J.E. Bernier, discovered pyrite with minor sphalerite and galena on the south side of Strathcona Sound. J.F. Tibbet and F. McInnes, two prospectors, travelled from Churchill by dog team in 1937 and staked two claims on a pyrite showing near the western end of the Strathcona Sound deposit. They had very little time to work and their claims lapsed the following year.

In 1954, R.G. Blackadar and R.R.H. Lemon of the Geological Survey of Canada, mapped the area and visited some of the pyrite showings (Blackadar, 1956). Having read Blackadar's report, geologists from Texas Gulf Sulfur (now Texasgulf Inc.) staked several claims in 1957. Detailed geological and geophysical surveys and trenching tested the showings in 1958. Between 1961 and 1965 over 85,000 feet of drilling outlined the ore body and tested several other showings. Geological surveys and 2,000 line feet of geophysical surveys were done between 1966 and 1967. In 1969 an adit and four cross-cuts explored the east end of the main orebody, and in 1970, a 50-ton sample was taken for metallurgical testing.

In 1972 Mineral Resources International Ltd. obtained a long term option on the Strathcona Sound deposit whereby they would acquire a 65% interest in the property by bringing it into production. The firm of Watts, Griffis and McOuat was engaged to prepare a feasibility study. The west end of the deposit was drilled and bulk sampled and the GULL claims were staked in late 1972. A feasibility study and additional geological, geophysical and geochemical sur-surveys were completed and heavy equipment was delivered by sea-lift in 1973. A new company, Nanisivik Mines Ltd., formed in 1974 to bring the deposit to production, is owned 59.5% by Mineral Resources International, 18% by the Government of Canada, 11.25% by Metallgesellschaft Canada Ltd. and 11.25% by Biliton B.V.

Early in 1974 a new firm, Strathcona Mineral Services Limited was formed to manage the project.

Between August 1974 and March 1975, two adits and a connecting ramp were excavated in the western end of the main ore body. The upper level is the mining horizon and follows the top of the ore zone; the lower adit is the main service drift to the crushing, screening and storage facilities.

DESCRIPTION
The regional geology of the Strathcona Sound-Arctic Bay area has been discussed in several papers and is shown on Map 1237A, Arctic Bay-Cape Clarence (Blackadar *et al.* 1968b).

The stratigraphy and lithology of the area are given in the table below. Preservation and present distribution of Proterozoic rocks is controlled by a major northwesterly trending 25 km wide graben that extends across the Borden Peninsula. Within this system the Proterozoic sediments have been downdropped, folded and faulted into a series of smaller horsts and grabens and intruded by a distinctive parallel trending gabbro dyke swarm. The sediments strike perpendicular to the graben system.

The Society Cliffs dolomite, which underlies most of the Nanisivik property and much of the graben, contains the orebody. It usually forms cliffs and takes its name from the spectacular St. Georges Society Cliffs that form the north shore of Adams Sound from Arctic Bay to Admiralty Inlet. In the vicinity of the deposit, the Society Cliffs dolomite is typically a medium to dark brown laminated algal dolomite. Solution breccia, flat pebble conglomerate, vugs, petroliferous odor and stain, carbonaceous matter, and narrow recrystallized veinlets of carbonate are common.

Geldsetzer (1973a, 1973b) has shown that dolomitization, solution and collapse brecciation, karsting,

[1]Staff Geologist, D.I.A.N.D. [2]Arctic Islands District Geologist, D.I.A.N.D.

STRATIGRAPHIC SEQUENCE - STRATHCONA SOUND, NORTH BAFFIN ISLAND
(after Lemon and Blackadar, 1963)

Period	Group	Formation	Thickness (Feet)	Lithology
Quaternary				Silts, gravels, clays
		Unconformity		
PALEOZOIC Cambrian-Ordovician	ADMIRALTY GROUP + 2580	Baillarge	+ 460	Limestone, fossiliferous
		Ship Point	920	Flaggy dolomite, fossiliferous
		Turner Cliffs	± 350	Sandstone, siltstone, mudstone, shale
		Gallery	± 600	Sandstone
		Angular unconformity		
				Gabbro dykes
		Intrusive contact		
PROTEROZOIC Helikian	ULUKSAN GROUP 6850	Elwin	± 2500	Sandstone, siltstone, shale
		Strathcona Sound	± 2500	Mudstone, siltstone
		Victor Bay	+ 600	Dolomite, minor limestone, mudstone, edgewise conglomerate
		Society Cliffs	+ 900	Dolomite, solution breccia and conglomerate, algal laminae
		Arctic Bay	+ 350	Calcareous shale
		Disconformity		
	EQALULIK GROUP	Adams Sound	+ 4000	Quartzite, minor shale, conglomerate
		Nauyat	± 1000	Andesite and basalt flows, tuffs
		Lower Quartzite	± 50	Quartzite
		Angular unconformity		
Aphebian				Biotite gneiss, granitoid gneiss

mineralization and cementation of the breccias took place in a restricted time interval between deposition of the Society Cliffs and Victor Bay Formation. Furthermore, uplift and erosion, depth and degree of karsting and brecciation of the Society Cliffs Formation increase in a westerly direction. Field evidence supporting this interpretation includes:

- almost total brecciation of algal laminated Society Cliffs Formation in the west, decreasing in depth and amount to virtually none in the east
- the sharp facies change between the Society Cliffs dolomite and the black fine grained clastics of the basal Victor Bay Formation which have not filtered down into the breccia zones, which suggest cementation and mineralization of the dolomite before deposition of the clastics
- the Victor Bay Formation is unbrecciated, unmineralized, and incompletely dolomitized.

The sulphide body is flat-lying, trends east for 10,000 feet and has an open shape similar to a gentle river meander. In cross section the sulphide zone is a horizontal lens 200 to 400 feet wide and up to 60 feet thick in the centre. An envelope of massive pyrite commonly separates the lead-zinc ore from the barren dolomite. Sulphides are rarely found above this horizontal lens, but deep drilling commonly intersects a vertical keel of pyrite. Smaller horizontal wings may contain lead-zinc mineralization. The keel has been interpreted as a root or feeder vein and also as a cave channel. Pyrite stalactites found in a section of the pyrite keel exposed in a valley wall just south of the west end of the main ore deposit support the latter interpretation.

The Watts, Griffis and McOuat Limited feasibility report concluded the Strathcona Sound orebody contains 6,970,000 tons averaging 14.1% Zn, 1.4% Pb and 1.8 oz. Ag per ton, based on a cutoff grade equivalent to 7% zinc (Mineral Resources International Annual Report 1974).

The main ore body has been outlined by an HF vertical loop EM survey using a 600-foot spread. Horizontal loop EM and magnetometer surveys gave little or no information (Clayton, 1966). VLF EM-16 surveys outlined the anomaly corresponding to the main ore body and several additional anomalies.

Sphalerite and galena are the most important ore minerals; pyrite is the major gangue mineral. Minor amounts of dolomite and calcite and traces of quartz, pyrrhotite and chalcopyrite are present in the ore zone. Sphalerite is generally coarse grained and varies in colour from light buff to dark brown, mostly due to an iron content varying from 0.25 to 7.15 weight per cent. Cadmium and silver content are also variable and are associated with sphalerite. Much of the ore zone shows roughly horizontal 0.5 to 2 cm thick sphalerite layers alternating with sparry carbonate and/or pyrite layers. Most of the sulphide-dolomite contacts are very sharp and well defined. Solution and collapse breccias seem to be less common in the immediate vicinity of the ore.

CURRENT WORK AND RESULTS

Mine development was completed in March, 1975, and construction of the mill, crusher, townsite, dock, airport and a road to Arctic Bay continued.

Exploration on the property included reconnaissance REM (McPhar vertical loop) surveys over known showings, detailed geological mapping in the vicinity of the ore body and several hundred feet of underground drilling. This work did not produce any significant new data.

HOPE BAY MINE	Silver
Hope Bay Mines Limited	77 A/3
Suite 1840, 777 Hornby Street,	68°12'N, 106°32'W
Vancouver, B.C.	

REFERENCES

Fraser (1964); Gibbins *et al.*, (1977); Padgham *et al.*, (1976); Thorpe (1972).

PROPERTY

VAN 1-18

LOCATION

The property is near Hope Bay on the Arctic Coast, 450 miles north-northeast of Yellowknife. It can be reached by barge from Cambridge Bay on Victoria Island, 80 miles to the northeast.

HISTORY

The VAN claims were staked in 1965 for Roberts Bay Mining Company to cover the Roberts Lake silver showing. In 1973 Hope Bay Mines Limited was incorporated to develop the property. A 400-foot decline was sunk and 10 tons of hand sorted ore, averaging 4,863 oz/ton were shipped.

In 1974 Hope Bay Mines Limited, Van Silver Exploration Limited and Reako Explorations Limited jointly built a 50-75 ton mill, began mining the high grade ore and produced 64,244 ounces of silver from 843 tons averaging 76 oz/ton Ag.

DESCRIPTION

The silver showing is along the eastern edge of a north-south striking meta-volcanic belt, near its contact with granitic rocks.

Silver occurs in quartz pods of lenses and in calcite-cemented breccia associated with closely-spaced, easterly striking fractures. Galena and sphalerite are commonly found with the silver in the calcite breccia and in the wall rocks surrounding the fractures.

CURRENT WORK AND RESULTS

During 1975 10,763 ounces of silver were produced from 712 tons of ore grading 15.1 oz/ton Ag. Eight tons per day were milled during June, July and August.

PINE POINT MINES	Lead, Zinc
Pine Point Mines Ltd.	85 B/10, 15, 16
Pine Point, N.W.T.	60°50'N, 114°25'W

REFERENCES

Bell (1902); Campbell (1957, 1966, 1967); Douglas and Norris (1974); Jackson and Beales (1967); Jackson and Folinsbee (1969); McGlynn (1971); Norris (1965); Patterson (1975); Skall (1975).

PROPERTY

4,326 claims

LOCATION

The Pine Point claim block is several miles wide and stretches for 33 miles along the south shore of Great Slave Lake, 110 miles south of Yellowknife. A 60 mile gravel highway connects Pine Point with Hay River and a short gravel airstrip at the mine site will handle most propeller driven aircraft. A spur line of the Great Slave Railway provides concentrate and freight transport. The location of important ore deposits are given in Figure VII-1.

HISTORY

First reports of the lead-zinc showings at Pine Point were made by R. Bell (1902) who saw them in 1899. Apparently the showings were first found by Indians and in 1897 several claims were staked by prospectors. In 1929 Northern Lead Zinc Company was formed and Ventures Limited and Cominco Limited became associated with the enterprise.

A three year concession of exclusive prospecting rights in a 500 square mile area was granted to these companies in 1948. When the concession expired in 1951, over 1,000 claims were staked and a new company, Pine Point Mines Limited, was incorporated. By 1955, some 180,000 feet of drilling had outlined 5 million tons averaging 4% lead and 7% zinc.

The Great Slave Railroad was completed and the first high grade ore was shipped in November 1964. A 5,000 ton per day concentrator was completed in 1965 and expanded to 10,000 tons per day in 1969.

Pine Point Mines Ltd. have increased their ore reserves by continuing exploration including more than one million feet of diamond drilling and the purchase of the X-15 and W-17 deposits from the Pyramid Mining Co. in 1966, the R-61 and S-65 deposits from Coronet Mines Ltd. in 1972 and the A-55 (408) deposit from Conwest Exploration Ltd. and Newconex Canadian Exploration Ltd. in 1974.

DESCRIPTION

The Pine Point area is underlain by several hundred feet of gently southwest dipping Middle Devonian limestone, dolomite and shale (Figure VII-2) (Norris

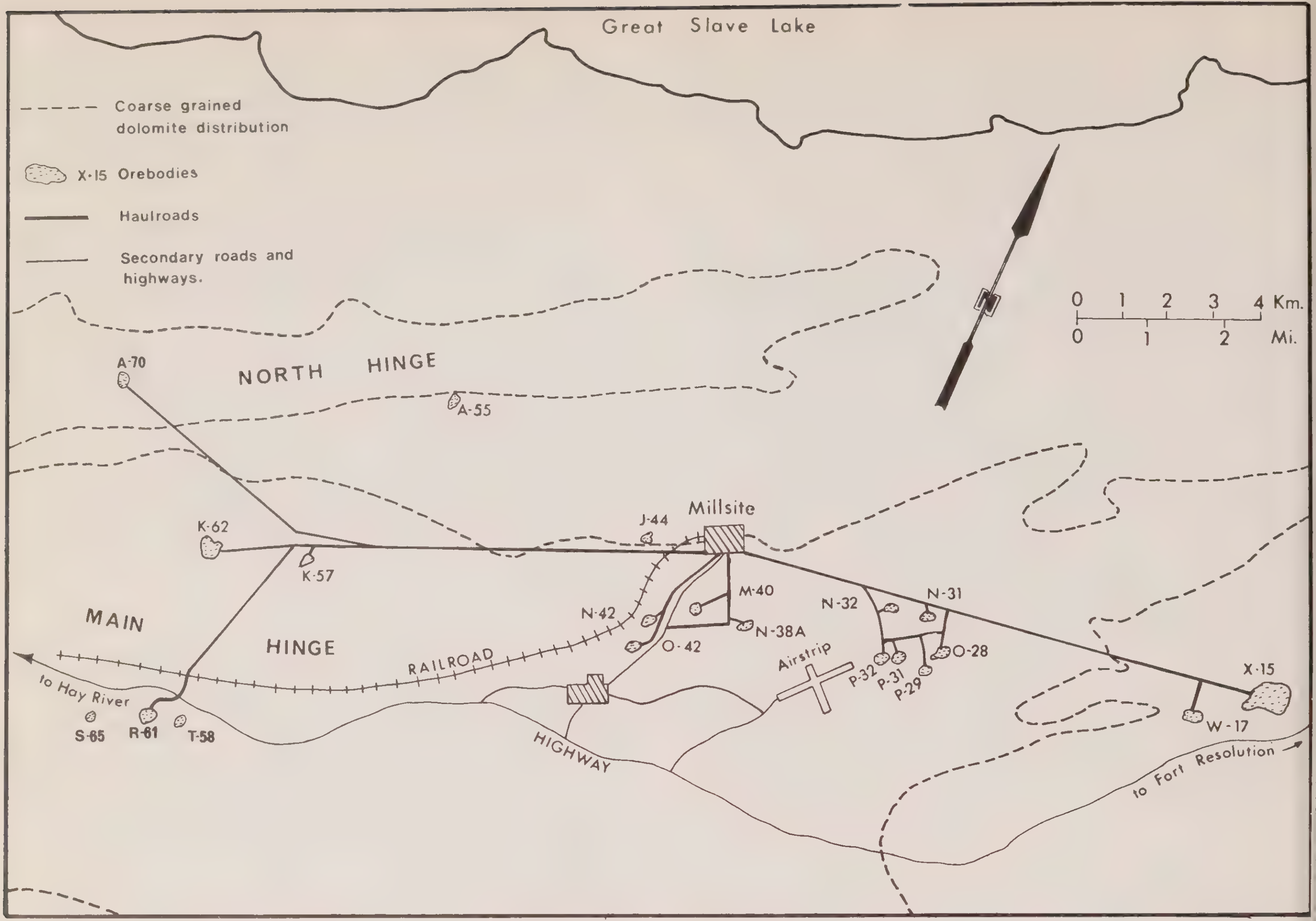


Figure VII-1: Plan of Pine Point Mines operations showing the various pits and ore bodies. (Information provided by Pine Point Mines Ltd.)

1965, Douglas and Norris 1974 and Skall 1975). Within this sequence, the Pine Point barrier reef complex occupies a key position between evaporites in the south and shales in the North (Skall, 1975).

In pre Amco shale time, extensive karsting and normal faulting took place parallel to the trend of the reef complex. These faults form the Hinge Zones along which coarse grained dolomite of the Presqu'ile or K Facies and much of the lead zinc-mineralization is spatially related.

Some 40 orebodies have been discovered ranging in size from 0.25 to over 15 million tons. Orebodies may be tabular, stratabound and bedded deposits controlled by porosity variations in the reefal complex or pipe-like prismatic deposits developed in solution collapse structures. However, many of the Pine Point deposits are dissimilar and very few generalities can be applied to all deposits.

According to Patterson (1975) colloform textures exhibited by sphalerite represent rapid precipitation and accumulation of very fine crystals, rather than precipitation from a colloidal gel. Abundant skeletal and radiating galena crystals (Figure VII-4) are believed to represent contemporaneous deposition. Other reniform textures represent sulphide speleothem including cave corals and stalactites.

Campbell (1966, 1967) believed that movement of ore fluids, of magmatic origin, was controlled by large faults in the basement. Jackson & Beales (1967) however, contend that the reef formed on the fault scarp, and the mineralization and dolomitization have no direct relationship with this structure. They proposed that the sulphides formed as a result of mixing of a hypersaline brine carrying lead and zinc as chloride complexes, from adjacent basinal shaly sediments with hydrogen-sulphide bearing waters from the back reef carbonate-evaporite complex.

CURRENT WORK AND RESULTS

Approximately 1.8 million dollars were spent on exploration by Pine Point Mines Ltd. in 1975. Most of this was spent at Pine Point, while a small amount was spent on the Windy Point project. The major cost was drilling more than 170,000 feet. Surface and down hole IP testing was continued. Drilling in and around known ore bodies outlined additional lower than average grade mineralization. At the end of 1975 the T-58 zone, containing 600,000 tons of 17% combined lead and zinc was discovered on the former Coronet property. Reserves at year end were 39.2 million tons averaging 2.0% lead and 5.4% zinc.

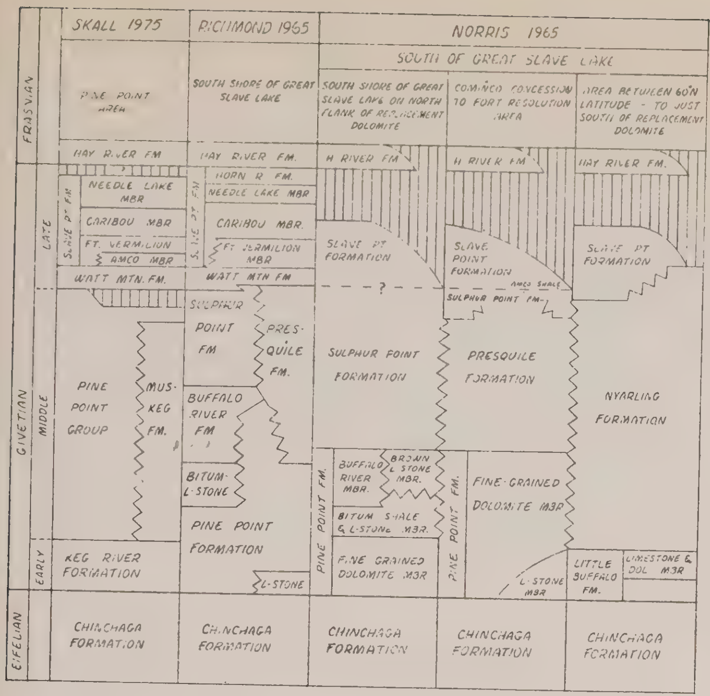


Figure VII-2: Nomenclature of stratigraphic units on the South shore of Great Slave Lake from Skall (1975)

Figure VII-4: Skeletal galena from Pine Point.

Seven pits were active: W-17, X-15, N-42, N 38A, K-57, K-62 and R-61. At times underground production from M-40 exceeded 500 tons per day. Overburden and waste rock removed was 8.4 million tons as the stripping ratio continued to rise with deeper orebodies now being mined. A contract was let for removal of an additional 4 million tons of overburden.

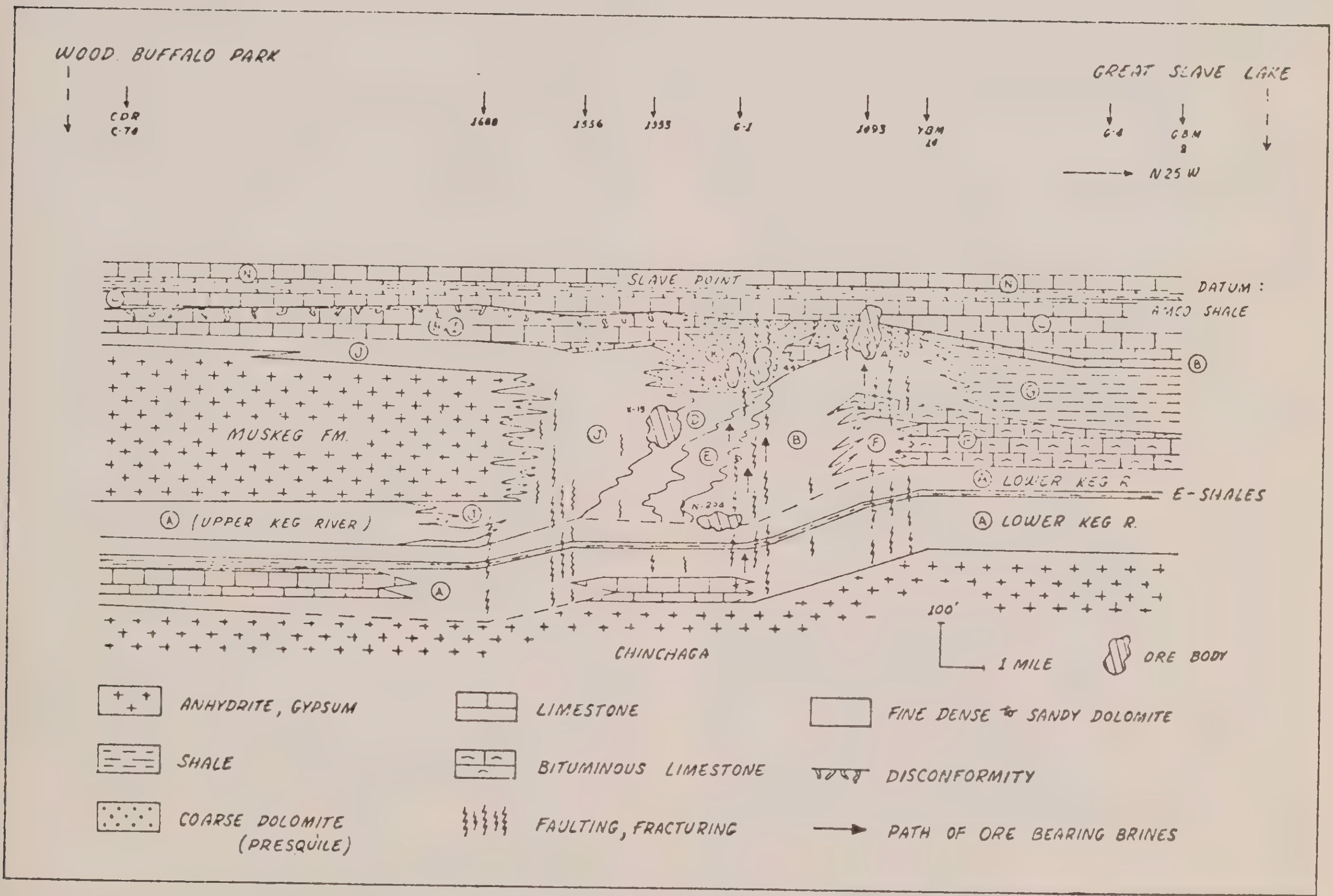


Figure VII-3: Composite geologic cross section of the Pine Point barrier complex showing various facies of the Pine Point Group (from Skall 1975).

PINE POINT MINES PRODUCTION DATA

YEAR	TONS MILLED DAILY	MILLIONS TONS MILLED IN YEAR	GRADE % Pb	% Zn	METAL CONTAINED IN CONCENTRATE MILLIONS OF LBS. Pb.	Zn	AVERAGE PAYROLL
1973	10,674	3.896	2.90	6.01	211.4	433.1	550
1974	11,513	4.135	2.58	5.28	201.8	410.9	587
1975	10,844	3.905	2.37	4.88	173.1	351.9	649

Compiled from figures supplied to Regional Mining Engineer by Pine Point Mines

CON MINE
CON-RYCON PROPERTY
Cominco Limited,
Yellowknife, N.W.T.

Gold, Silver
85 J/8
62°27'N, 114°22'W

REFERENCES
Baragar (1962); Baragar and Hornbrook (1963); Boyle (1961); Campbell (1947, 1949); Gibbins *et al.* (1977); Henderson and Brown (1966); Henderson (1970, 1976); Jones (1977); Lauer (1957); Lord (1951); McGlynn (1971); Padgham, Kennedy *et al.*, (1975); Sproule (1952); Thorpe (1966, 1972).

PROPERTY
CON 1-14, P & G 1-4

LOCATION AND ACCESS
The CON-RYCON property is one mile south of Yellowknife, on the west side of Yellowknife Bay.

HISTORY
The CON claims were staked in 1935 for Consolidated Mining and Smelting. The CON shaft was started in 1937 and a 100-ton per day mill was put into operation in 1938. The mill capacity was increased to 350 tons per day in 1942.

The P & G claims were staked in 1936 and Rycon Mines Limited was incorporated to explore and develop them. The Rycon shaft was started in 1938 and crosscuts on the 500 and 950-foot levels were extended easterly from the Con shaft to connect with the Rycon workings. In 1936 the first Rycon ore was received at the Con Mill.

The Negus Mine opened in 1939 with a 50 ton mill but shut down in 1951. Its shafts are now being used by Cominco Limited to ventilate the Con Mine.

In 1944 the Campbell system of ore-bearing shear zones was discovered and in 1948 was intersected by a crosscut from the Con Mine's 2,300-foot level. Production began in 1956. The 5,429-foot Robertson shaft started in 1973 to facilitate production from the deeper levels was commissioned in 1977.

Between 1939 and 1975 approximately 3,000,000 ounces of gold and 1,000,000 of silver were produced from 5,000,000 tons of ore.

DESCRIPTION
The country rocks are Archean metabasalts and meta-andesites of the Kam Formation cut by a swarm of westerly-dipping gabbroic dykes. Mineralized shear zones cut the volcanics and are in turn cut by large faults. Two major shear zones, the Con and the Campbell, have been exploited in the Con Mine.

The Con shear zone, which has an average strike of 020° and an average dip of 60°W, varies from 10 to 250 feet in width and has been traced on the surface for 5 miles. The Campbell shear zone strikes 020° and dips 50°W and lies about 3,000 feet east of the Con system. It may be the faulted extension of the Giant shear zone. It ranges from a few hundred feet to more than a thousand feet in width and has been traced over a strike length of 5 miles. The shear zones consist of interlacing schist zones and unsheared horses of country rock. The ore bodies, commonly 3 to 20 feet wide and less than 300 feet long, occur around the unsheared horses or at flexures as quartz lenses, pods and replacement bodies mineralized with pyrite, arsenopyrite, stibnite, chalcopyrite, sphalerite, sulphosalts, galena and gold. All current production is from the Campbell shear zone.

CURRENT WORK AND RESULTS
The seventeen million dollar expansion begun in 1973 continued in 1975. A mechanised stoping system using trackless equipment was supplying about 30% of the production by the end of the year. The Robertson shaft reached the 4,300-foot level and the 250-foot high headframe and hoist installation was close to completion at year end. Production from this shaft is expected late in 1976. Expansion of the mill from 450 to 650 tons per day is planned.

Reserves at year end were 1,700,000 tons grading 0.58 oz/ton Au.

PRODUCTION AND DEVELOPMENT DATA: CON MINE

YEAR	ORE MILLED TONS DAILY	TOTAL FOR YEAR	GRADE Au oz/ton	PRODUCTION Au oz	PAYROLL
1974	398	145,205	0.60	83,565	219
1975	405	148,482	0.55	77,708	236

YEAR	DRIFTING	SINKING	RAISING	UNDERGROUND DIAMOND DRILLING
1974	5,180	2,461	1,629	39,851
1975	5,886	1,824	1,052	43,245

All development figures in feet

GIANT MINE
GIANT-LOLOR-SUPERCREST PROPERTY
Giant Yellowknife Mines Limited
Yellowknife, N.W.T.

Gold, Silver
85 J/8, 9
62°30'N, 114°22'W

REFERENCES
Baragar (1961, 1962); Boyle (1961); Brown, Dadson and Wrigglesworth (1959); Dadson and Emery (1968); Gibbins *et al.*, (1977); Henderson and Brown (1966); Henderson (1970, 1976); Lord (1951); McGlynn (1971); Padgham, Kennedy *et al.*, (1975); Thorpe (1966).

PROPERTY
AES 27-50, GIANT 1-21, LOLOR 1-7

LOCATION
Giant Mine is 2.25 miles north of Yellowknife, on

the west side of Yellowknife Bay.

HISTORY

The lower part of the Yellowknife River basin was explored in 1933 and staked as the GIANT claims in 1935. In 1937 Giant Yellowknife Mines Ltd. was incorporated to acquire and develop the property and in 1944 drilling in the Baker Creek Valley intersected gold-bearing shear zones and veins. A 500 ton per day mill, put into operation in 1948, was gradually increased to 1,000 tons per day by 1960.

The LOLOR and AES claims were staked in 1936. During the 1950's the 750-foot level of Giant Mine was extended into the LOLOR claims and production commenced in October, 1967.

In 1964 a drift was started from the 750-foot level of Giant Mine to the AES or Akaitcho ore zone on the Supercrest property and production began in October, 1967. In 1969 a 4,000 foot drift was driven from the 1,100-foot level to the Akaitcho zone.

In 1974 an open pit was developed near the south end of the property to mine a zone. which to a depth of 300 feet, contains about one half million tons grading 0.3 oz/ton Au.

DESCRIPTION

The country rocks are northeast-striking, steeply west-dipping, overturned Archean meta-andesites and meta-basalts of the Kam Formation, intruded by gabbro dykes. Shear zones containing the Giant ore bodies cut both the volcanics and associated gabbros and are cut by diabase dykes and late faults. The shear zones consist of subparallel, interlacing chlorite-sericite schist zones and horses of unsheared greenstone. Irregular and lenticular orebodies ranging from 3.5 to 50 feet in width are composed of fine-grained quartz and sericite schist with about 7% metallic minerals, mainly pyrite, arsenopyrite, stibnite, sphalerite, sulphosalts and gold.

CURRENT WORK AND RESULTS

Giant Mine produced 342,000 tons grading 0.271 oz/ton Au during the year. Significant mine developments included a start on pillar recovery in higher grade portions of the upper B-shaft and expansion of long-hole stope work in the upper C-shaft. Full scale production commenced from the open pit and by year-end 98,000 tons of pit ore had been stockpiled for processing in 1976. The Supercrest property produced 32,000 tons of ore grading 0.46 oz/ton Au and underground drilling added 12,000 tons of new ore. The Lolor Mine produced 18,000 tons of ore grading 0.265 oz/ton Au.

At the end of the year ore reserves of the GIANT-LOLOR-SUPERCREST properties were 1,950,000 tons grading 0.33 oz/ton Au.

PRODUCTION AND DEVELOPMENT DATA: GIANT MINE

YEAR	TOTAL TONS MILLED	TONS MILLED PER DAY	PRODUCTION OUNCES Au	PRODUCTION OUNCES Ag	GRADE OUNCES Au	GRADE OUNCES Ag
1974	328,099	899	101,514	21,418	0.31	0.07
1975	391,969	1,073	98,437	21,473	0.29	0.06

YEAR	RAISING	DRIFTING	DIAMOND DRILLING UNDERGROUND	DIAMOND DRILLING SURFACE	PAYROLL
1974	4,739	6,353	224,504	14,780	326
1975	3,814	10,520	160,040	1,070	360

All development data in feet

TERRA MINE
Terra Mining and Exploration Company Limited
Suite 204, 8631-109 Street,
Edmonton, Alberta,
T6G 1E8

Copper, Silver, Bismuth
86 E/9
65°36'N, 118°07'W

REFERENCES

Gibbins *et al.*, (1977); Hoffman *et al.*, (1976); Kidd (1936); Murphy and Shegelski (1972); Padgham, Kennedy *et al.*, (1975); Shegelski (1973); Shegelski and Thorpe (1972); Thorpe (1972).

PROPERTY

A 1-24

LOCATION

The mine is on the Camsell River, about 5 miles from its mouth and approximately 250 miles northwest of Yellowknife. Concentrates are trucked over a winter road to the Yellowknife highway at Rae or shipped by barge on the Great Bear Lake - Mackenzie River system. Airstrips at the mine and at the Norex Mine, eight miles away by an all-weather road, accomodate DC-3 aircraft which are used to ship jig concentrates, move personnel and bring in supplies.

HISTORY

The property, first staked as the YAW group, was restaked in 1966 as the A group and was taken over by Silver Bear Mines Limited, a wholly owned subsidiary of Terra Mining and Exploration Company Limited.

In 1968 an 1,800-foot decline with a 393-foot raise and 600 feet of drifting tested a drill intersection which graded 93.8 oz/ton Ag and 1.96% Cu over an average width of 6 feet. Milling at a rate of 150 tons per day began in September, 1969.

Reserves at the end of 1974 were estimated at 69,000 tons including 42,400 tons grading 55.1 oz/ton Ag and 26,000 tons grading 2.6oz/ton Ag and 3.1% Cu.

DESCRIPTION

The country rocks are Aphebian acidic volcanics, volcaniclastics, chert, argillite, sandstone and conglomerate intruded by a syenodiorite-syenite complex (Hoffman *et al.*, 1976). The volcanics and volcaniclastics enclose a 100-foot wide, northwest-trending zone containing more than 10% sulphide, mainly pyrite, pyrrhotite, and chalcopyrite with a mixture of argentite, cobalt and bismuth arsenides, native silver, and native bismuth. The silver-bismuth-cobalt minerals are in quartz-carbonate-hematite veins, along fractures perpendicular to the zone and are considered younger than the northwest-trending disseminated copper mineralization (Shegelski, 1973). Skutterudite, safflorite, rammelsbergite, pararammelsbergite, matildite, and sphalerite have been identified in the ore.

CURRENT WORK AND RESULTS

Three veins, nos. 10, 11 and 13, were mined

during the year. No. 10 vein was mined from surface to the 6th level and no. 11 vein from the 4th to 5th level. A decline driven to the 8th level on no. 11 vein discovered no. 9B vein. No. 13 vein discovered at the 500-foot level carries 200 to 700 oz/ton Ag across a 4-foot width.

TERRA MINE: PRODUCTION AND DEVELOPMENT DATA

YEAR	ORE MILLED TONS DAILY	TOTAL IN YEAR	GRADE Ag oz/ton	Cu%	PRODUCTION Ag oz	Cu lbs
1974	137	45,684	23.6	0.51	1,093,919	475,549
1975	117	42,881	30.8	0.13	1,330,165	110,382

YEAR	LAT-ERAL	RAIS-ING	UNDERGROUND DRILLING	AVERAGE PAYROLL
1974	6,021	2,145	11,774	53
1975	8,932	2,637	9,020	57

Development data in feet

ECHO BAY MINE — Silver, Copper
Echo Bay Mines Limited — 86 K/4, L/1
408, 10355 Jasper Avenue, — $66^{o}06$'N, $118^{o}00$'W
Edmonton, Alberta.

REFERENCES
Gibbins *et al.*, (1977); Hoffman and Bell (1975); Hoffman *et al.*, (1976); Lord (1951); Mursky (1973); Padgham, Kennedy *et al.*, (1975); Robinson (1971); Robinson and Ohmoto (1973); Schiller (1965); Schiller and Hornbrook (1964); Thorpe (1966, 1972).

PROPERTY
ECHO BAY 1-10

LOCATION
Echo Bay Mine is one mile northeast of Port Radium, on Great Bear Lake. Access is by aircraft to ice or gravel airstrips, by Northern Transportation Company barges or by winter road from Rae, 250 miles to the south.

HISTORY
The claims were staked in 1930 for Consolidated Mining and Smelting. Following trenching and diamond drilling two adits were driven on the western part of the property in 1934 to explore 5 mineralized veins. In 1963, following more diamond drilling and sampling of the underground workings, Echo Bay Mines Limited acquired the property. Production commenced from the two adit levels in October 1964 and the Eldorado plant and 140-ton mill were purchased in 1966. In 1968 an internal shaft with two levels was sunk from a third adit opened in 1967. The shaft was deepened to 1,250 feet providing eight levels in 1970 but a 150 foot thick diabase dyke was encountered between the 4th and 6th levels and by mid-August 1974 the ore in the mine was practically exhausted.

From 1964 to the end of 1974 approximately 22,750,000 ounces of silver and 9,210,000 lbs. of copper were produced from 352,000 tons of ore.

DESCRIPTION
The country rocks are northeast-striking, Aphebian andesitic lavas, ignimbrites and air-fall tuffs (Hoffman *et al.* (1976). Within the mine these volcanic rocks dip 35^{o} to 40^{o} southeast and are cut by a 150-foot thick diabase sill and two 100-foot thick diabase dykes of Helikian age.

The Echo Bay veins are quartz-carbonate filled fractures and shears found mostly within the tuffs. Within the mine they are offset approximately 300 feet by the northeast-striking A-fault. Three types of mineralized veins have been found: low grade veins of fine-grained argentite, coarse-grained galena, sphalerite, niccolite and pitchblende; irregular hematized quartz-carbonate veins containing native silver and argentite, with small high-grade offshoots of disseminated arsenides and chalcopyrite; and a narrow quartz-carbonate vein along the A-fault accompanied by alteration zones as much as eight feet wide containing argentite, minor native silver, considerable ruby silver and an unusually high bornite content.

CURRENT WORK AND RESULTS
The mill re-opened in February, 1975 to process ore recovered during clean-up operations in the mine. Ore from the Eldorado Nuclear and Ulster Petroleum properties was also milled.

PRODUCTION DATA: ECHO BAY MINE

YEAR	ORE MILLED TONS /DAY	TONS /YEAR	GRADE Ag oz/ton	Cu%	PRODUCTION Ag oz	Cu lbs	PAYROLL
1974	90	20,768	104	0.99	2,159,137	408,997	73
1975	85	31,251	28	1.28	876,346	790,375	112

CANTUNG MINE — Tungsten, Copper
Canada Tungsten Mining Corp. Ltd. — 105 H/16
Mine Office, — 61°57'N, 128°15'W
Tungsten, N.W.T.

REFERENCES
Blusson (1968); Brown (1961); Craig and Laporte (1972); Findlay (1967, 1969); Gabrielse *et al.*, (1973); Gibbins *et al.*, (1977); Green (1965, 1966); Green and Godwin (1963, 1964); Padgham, Kennedy *et al.*, (1975); Padgham *et al.*, (1976); Skinner (1961, 1962).

PROPERTY
AC 1-7; B 1-36; BC 1-8, 10-11; CED 1-49, 59-65, 67-73; EF 2, 5-8; O 1-36; P 1-36; PK 1-30; R 1-36; RL 1, 3-5, 8-10, 19-20; V 1-36; WO 1-11; Y 1-36.

LOCATION AND ACCESS
Cantung Mine lies in the Selwyn Mountains near the headwaters of the Flat River, 130 miles north of Watson Lake and a few miles east of the Yukon border. Access is by a 195-mile gravel road from Watson Lake to the south or by a short gravel airstrip at the mine site.

HISTORY
The area was staked as a copper prospect in 1954, but lapsed and was restaked for its tungsten potential in 1958. In 1959 Canada Tungsten Ltd. was formed to develop the property and by 1960 trenching, mapping and diamond drilling had outlined 1,176,000 tons grading 2.47% WO_3 and 0.5% Cu. Open pit mining

began in 1961 and milling started in 1962. From September, 1963 to May, 1964 mining and milling was suspended due to low tungsten prices. Milling was suspended again in 1967 when a fire destroyed the mill.

Diamond drilling in 1970 outlined 3,500,000 tons grading 0.65% WO_3 in the chert zone under and northeast of the open pit. In 1971 drilling intersected a skarn at the north end of the pit and by 1973, reserves of 4,242,000 tons grading 1.68% WO_3 and 0.22% Cu had been outlined. In 1974 Canada Tungsten Corp. Ltd. switched from open pit mining to underground mining of the new zone.

DESCRIPTION

The mine area is underlain by a northwest-trending, overturned syncline of Lower Paleozoic argillite, limestone, dolomite and chert, intruded by Cretaceous quartz monzonite. Within the lower limb of the syncline the quartz monzonite has altered Lower Cambrian limestone to a diopside-garnet-epidote skarn which hosted the open pit orebody. The orebody was a shallow, southwest dipping lens about 300 feet wide and as much as 65 feet thick comprising fine disseminated scheelite in a massive to heavily-disseminated pyrrhotite-chalcopyrite-sphalerite matrix crosscut by coarse-grained quartz-calcite-scheelite veins and lenses. Outside the skarn, banded chert containing scheelite and pyrrhotite forms extensive low grade tungsten reserves.

The gently, east-plunging E-zone, located 1,800 feet northeast and 700 feet below the open pit deposit is now the main orebody.

CURRENT WORK AND RESULTS

Since June 1974 all mining has been underground. Milling problems caused by a talc-like material and high silica content in the ore resulted in a low scheelite recovery for most of 1975 and a complete loss of copper production. Development work during the year consisted of 1,265 feet of drifting and crosscutting,1,107 feet of access ramps, 1,126 feet of stope development, 1,002 feet of raising and 238 feet of diamond drilling. Ore reserves at year end were 4,347,000 tons grading 1.6% WO_3 and 0.23% Cu.

CANTUNG MINE PRODUCTION DATA

YEAR	ORE MILLED		GRADE		PRODUCTION		PAYROLL
	TONS /DAY	TONS /YEAR	Cu%	WO_3%	Cu lbs.	WO_3 lbs.	
1974	467	170,614	0.16	1.46	163,665	3,557,600	104
1975	490	179,032	-	1.28	-	3,257,840	158

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PRELIMINARY REPORT OF THE PETROLOGY OF PART OF THE HACKETT RIVER GREENSTONE BELT, DISTRICT OF MACKENZIE, N.W.T.

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INTRODUCTION

The Hackett River greenstone belt, situated approximately 270 miles northeast of Yellowknife, is part of an Archean complex traced from the Back River northerly to the Mara River, a distance of about 100 miles. Reconnaissance mapping (Padgham *et al.*, 1975 a, b & c; Bryan *et al.*, 1975; Jefferson *et al.*, 1976 a, b & c; Frith and Hill, 1975; Frith *et al.*, 1977) indicates a steeply dipping homoclinal succession of predominantly andesitic to rhyolitic metavolcanic rocks conformably overlain to the east by Yellowknife Supergroup mudstone turbidites. A Kenoran granitic complex ranging in composition from quartz diorite to quartz monzonite is in intrusive contact with the western margin of the metavolcanic assemblage.

This report covers work completed during the 1975 field season under the auspices of the Resident Geologist's Office, Department of Indian Affairs and Northern Development, Yellowknife. The petrology of the rocks in N.T.S. 76F/9 forms the subject of an M.Sc. thesis by M.P.D. Bryan which is in progress at the University of Alberta.

METAVOLCANIC STRATIGRAPHY

The geological sketch map and stratigraphic column (Fig. VIII-1)show the distribution of the major metavolcanic rock types. The metavolcanic sequence may be broadly subdivided into a dominantly felsic to intermediate base, up to 8,500 feet thick, overlain by an intermediate to mafic succession with a maximum thickness of 6,500 feet. The sequence is usually capped by a carbonate-rich pyroclastic unit locally associated with a black graphitic argillite but in the study area a quartz-eye, quartz-feldspar crystal tuff sequence, which attains a maximum thickness of 700 feet, overlies the carbonate-argillite zone.

Complexity is added to this simplified picture by the high degree of intercalation between felsic and intermediate rocks, by a number of hypabyssal rocks ranging from gabbros to quartz-feldspar porphyries, and by the rapid thinning and thickening of lithologies along strike.

Map Units 1, 1a, 1b and 4: Felsic to Intermediate Rocks

As much as 8,500 feet of rhyolite or dacite pyroclastics with interbedded pillowed andesite form the basal sequence of the metavolcanic rocks within the area. Quartz-eye and quartz-feldspar crystal tuffs are common. Coarse agglomerates, lapilli tuffs, chert and cherty-tuffite pods are developed locally. Felsic flows were not positively identified but it is possible that some of the sheared quartz-feldspar crystal tuffs may in fact be flows. Thin quartz-feldspar porphyry sills occur sporadically throughout the felsic succession.

Crystal tuffs are strongly foliated, metamorphosed and commonly sheared so that the only original features remaining are quartz and feldspar phenocrysts. Quartz-eyes, as much as one quarter inch in diameter, are grey to blue and display features such as partial resorption, shattering, recrystallization and elongation parallel to the regional foliation. Feldspar crystals, up to one-eighth inch in length, are white to buff weathering and usually subhedral to euhedral. The matrix of these felsic pyroclastics is usually a fine-grained recrystallized aggregate of quartz, feldspar and muscovite with minor biotite, or actinolite and chlorite as the intermediate component increases.

Lapilli tuffs and agglomerates occur as pods or lenses up to 300 feet thick with fragments ranging in size from 0.1 to 1 inch. Fragments comprise as much as 35% of the rock and are usually felsic, commonly porphyritic, and are elongate parallel to the regional foliation. Chert and cherty tuffite pods, several inches to several feet in width with a very restricted strike length, occur sporadically throughout the felsic sequence.

Quartz-feldspar porphyry sills were observed only within the felsic section of the metavolcanic sequence. These intrusives up to 30 feet thick can be traced intermittently over distances approaching one half mile. Sub-rounded, blue-white quartz-eyes and pale pink to white, randomly oriented feldspar laths form as much as 60% of the rock. Contacts with the encompassing metavolcanic rocks are sharp.

Map Units 2 and 2a: Intermediate to Mafic Rock

Dacitic to basaltic metavolcanics are complexly interbedded throughout the complete stratigraphic sequence but are most abundant within the upper half of the metavolcanic pile. Pillowed and massive flows predominate, while pillow and flow breccias and pyroclastic rocks are of secondary importance. Volumetrically, andesite is the major rock type with basalt forming between 5 and 10% of the sequence. Most intermediate to mafic units are laterally continuous with strike lengths often of the order of miles. Thicknesses of individual flows are difficult to estimate, especially within the extensive pillowed sections where one flow commonly overlies another without apparent break.

Pillow lavas constitute about 60% of the intermediate-mafic metavolcanics. These fine-grained, grey-green weathering units are composed of thick accumulations of elongate pillows 2.5 - 3 feet in length. Pillow selvages usually weather dark green to black, but occasionally a rust brown colour is developed. Vesicular and amygdaloidal flows are more common towards the top of the stratigraphic sequence.

Amygdules are filled with quartz or calcite.

Intermediate flows are fine to medium-grained and weather dark green to grey. Thicknesses of the order of 100 feet were noted. Interbedded within the dominantly pillowed sequence are thin beds of polymictic intermediate to felsic pyroclastics and occasionally minor chert or cherty-tuffite units.

A diorite laccolith lies conformably within the pillowed and massive flows in the upper one third of the metavolcanic sequence. The diorite, composed of coarse-grained hypidiomorphic plagioclase and green to black hornblende laths, is approximately one half mile in thickness and has been traced along strike for approximately two miles.

Map Unit 3: Calcareous and Graphitic Rocks

The metavolcanic sequence is usually capped by a carbonate-cemented intermediate to felsic, pyroclastic and detrital layer, attaining a maximum thickness of 75 feet. Conformably overlying, or cyclically interbedded with the brown to black weathering calcareous unit is a black graphitic argillite sequence with a maximum thickness of 25 feet.

The transition from the underlying intermediate and mafic flows to this calcareous unit is gradational over a one quarter mile interval. Calcite (or siderite) becomes increasingly abundant as vesicle infillings, as a replacement within pillow selvages, or as veins and disseminations towards the top of the metavolcanic assemblage where it constitutes as much as 50% of the pyroclastic-tuffite sequence. The calcareous unit, which to the north of the area contains extensive accumulations of well-bedded limestone or dolostone, may be traced for several miles along strike.

The graphitic argillite, intermittently traced over a five mile strike length, is fine grained, fissile and recessive. Pyrite is commonly present in disseminated, bedded or concretionary form and may compose up to 15% of the rock.

Map Unit 5: Yellowknife Supergroup Metasediments

Greywacke turbidites and shales conformably overlie the metavolcanic sequence. The metavolcanic-metasedimentary contact is often gradational with thin stringers of volcanogenic siltstones occurring at the base of the metasediments. Progressing eastward from the metavolcanic-metasedimentary contact, two features are apparent. There is a gradation into typical greywacke mudstone turbidites, and there appears to be a slight drop in the iron content of the metasediments away from the contact. One-eighth to one-half mile east of the contact there is a thin bed of silicate-magnetite-iron formation that outcrops sporadically to the south of the area. Lateral continuity of this lithology is inferred from aeromagnetic data.

Map Unit 6: Granitic Intrusives

Structurally underlying the metavolcanic sequence is a large granitic complex, which includes granitic gneiss and undifferentiated quartz monzonite and quartz diorite. Intruding this heterogenous assemblage are muscovite-rich granitic to monzonitic stocks. Contact effects between the granitic complexes and the meta-volcanic rocks are variable, with the metavolcanics displaying completely unaltered to highly gneissic textures. Migmatites are only locally developed. The margin of the granitic rocks adjacent to the metavolcanics is typically a medium-grained granodiorite, which is normally foliated to gneissic in appearance. Xenoliths of metavolcanic rocks are common within the granodiorite margin.

Helikian Dykes

Several north-west-trending gabbroic dykes exhibiting a diabasic texture cut the complete assemblage within the area. These medium- to coarse-grained dykes, which are part of the Mackenzie dyke swarm (Fahrig and Wanless, 1963) are commonly more than 50 feet in width. Contact effects between the reddish brown weathering dykes and the greenstone assemblage are difficult to establish as the dykes are bounded by overburden.

PETROGRAPHY

Map Units 1, 1a, 1b and 4: Felsic to Intermediate Rocks

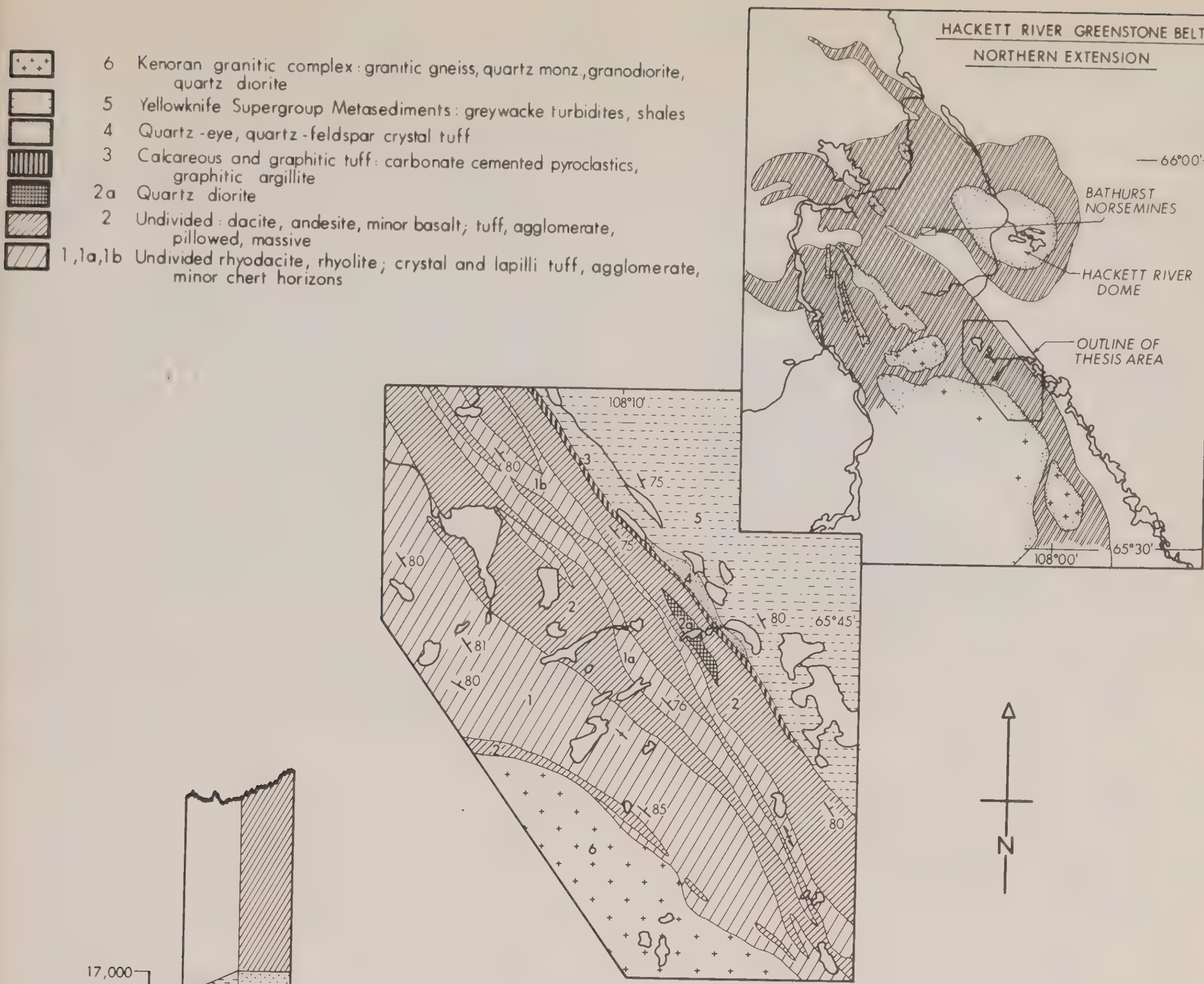
Foliated to schistose crystal tuffs are characteristic of the intermediate metavolcanic succession. Quartz phenocrysts, which are present in most of the felsic rocks, are typically recrystallized, resorbed, fractured, embayed or show evidence of strain. They commonly constitute up to 15% of the rock and are locally cut by secondary biotite and chlorite stringers. Subhedral to euhedral feldspar phenocrysts, sanidine to albite-oligoclase, are usually clouded, saussuritized or altered to a very fine grained material. The groundmass is a recrystallized polygonal aggregate of quartz and feldspar. Foliation is expressed by tabular biotite laths, lesser amounts of muscovite, and occasionally by chlorite.

In the more intermediate members, colorless to pale green actinolite or green to yellow hornblende may form as much as 20% of the rock. Hornblende phenocrysts are commonly ragged, poikilitic, and commonly display patchy alteration. Typical alteration products are actinolite, biotite or chlorite.

Map Units 2 and 2a: Intermediate to Mafic Rocks

Porphyritic andesites containing amphibole and plagioclase phenocrysts are predominant. Ragged hornblende phenocrysts are usually pleochroic from dark to pale green and commonly display patchy alteration along cleavage planes or fractures. Alteration to pale green to colorless actinolite, biotite and chlorite is common. Subhedral albite-oligoclase laths are commonly clouded and highly altered to saussurite and sericite.

The groundmass is usually a fine-grained recrystallized aggregate of altered hornblende, epidote, clinozoisite, minor biotite and chlorite. Quartz is present in the groundmass and as a vesicle infilling.



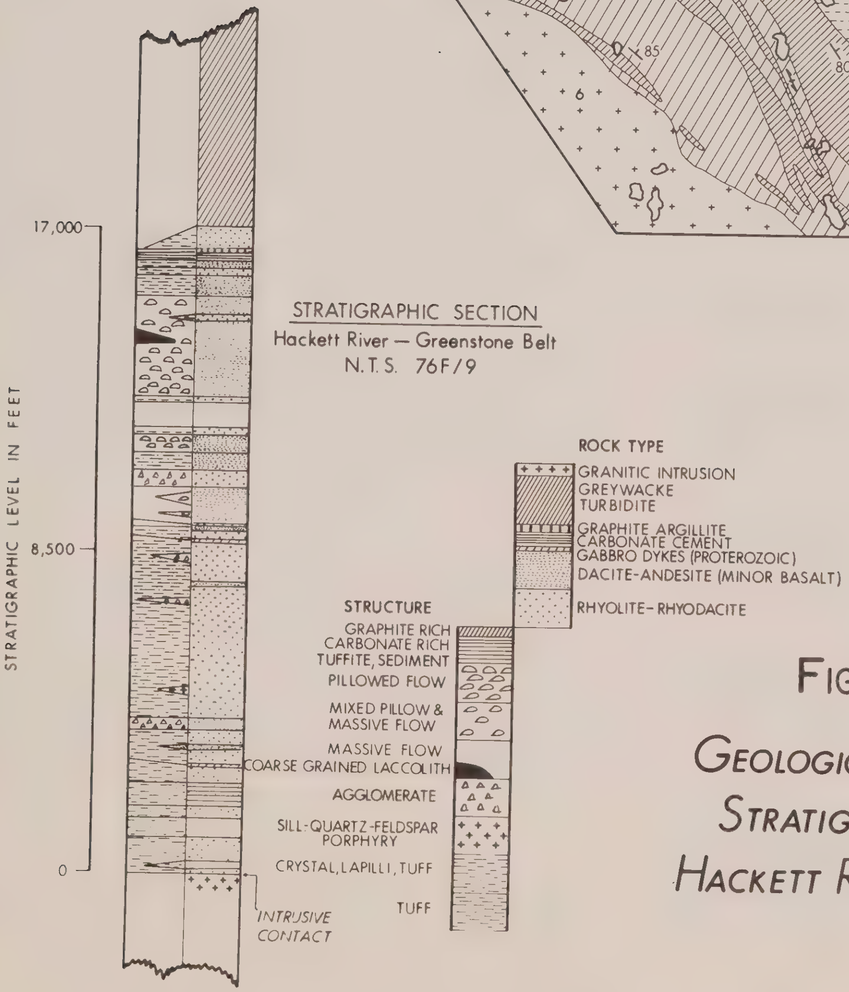


FIGURE VIII-1

GEOLOGICAL SKETCH MAP AND STRATIGRAPHIC SECTION OF HACKETT RIVER GREENSTONE BELT

Groundmass textures range from pilotaxitic to fluidal.

Map Unit 6: Granitic Rocks

Granitic Rocks are typically coarse grained and contain principally quartz, microcline and albite-oligoclase. Mafic minerals, hornblende and biotite, form as much as 20% of the rock. Chlorite and epidote are common secondary minerals.

SUMMARY

The Hackett River metavolcanic belt, with a maximum stratigraphic thickness exceeding 14,000 feet differs from other greenstone belts in the Slave Province such as the Yellowknife and Cameron River metavolcanic belts in the abundance of felsic rocks in the succession. Whereas the Yellowknife greenstone belt is dominated by basalt (Baragar, 1966), the Hackett River belt has only 5 to 10% basalt. The most important rock types in the Hackett River belt are pyroclastic dacites and rhyodacites overlain by pillowed to massive andesites. Metamorphic grade within the thesis area ranges from upper greenschist to epidote amphibolite facies. Pressures developed during metamorphism appear to be relatively low.

ACKNOWLEDGMENTS

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PRELIMINARY REPORT ON THE VOLCANIC SUITES OF THE EAST ARM, GREAT SLAVE LAKE, N.W.T.

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INTRODUCTION

The East Arm, Great Slave Lake, is the site of a Proterozoic clastic wedge over 15 km in thickness. The wedge contains five major volcanic sequences which have not been previously examined in detail. The present study attempts to detail the petrology and chemistry of the lavas in order to test and elaborate on the current interpretation of the East Arm as the failed arm of a triple-rift system.

The general geology has been described by Stockwell (1936 a and b), while the detailed stratigraphy and tectonic framework has been investigated by Reinhardt (1969) and Hoffman (1968, 1973). Using largely stratigraphical and sedimentological evidence, Hoffman *et al.* (1974) have interpreted the area as the failed arm of a triple-rift system which included the Coronation geosyncline. During the 1976 season, Hoffman remapped all of the Proterozoic rocks of the East Arm on a scale of 1:50,000 (Hoffman *et al.* 1977). This work has provided a detailed stratigraphical framework and has led to some important revisions of the tectonics of the area.

The Proterozoic volcanics have been metamorphosed to very-low or low grade (according to the scheme of Winkler, 1974). A key problem is therefore the recognition and identification of the original magma type through the veil of alteration. Stable-trace-element studies have been used to identify original magma compositions. These magma types can be useful indicators of tectonic environment (e.g. Pearce and Cann 1973; Floyd and Winchester 1975; Smith and Smith 1976) and therefore provide evidence for the tectonic evolution of the East Arm.

A total of 18 weeks of field work during the 1974-1976 seasons were spent mapping (1:50,000) and measuring sections in almost all volcanic localities in the East Arm. The objectives were to detail the facies variations within the main volcanic sequences and to collect lavas for petrographic and chemical analysis.

VOLCANIC STRATIGRAPHY AND PETROGRAPHY

The five major volcanic sequences are briefly described below in stratigraphical order. Figure IX-1 shows the approximate outcrop pattern and Figure IX-2 illustrates the stratigraphical position of the volcanic suites. Within some of the localities intrusive diabase makes up a significant proportion of the outcrop.

Wilson Island Group

The basal part of the Wilson Island Group contains the oldest sequence of volcanic rocks in the East Arm. A bimodal basal unit of over 1400 m of amygdaloidal basalt and red to purple rhyolite forms flow units (3-30 m thick) interbedded with chlorite-muscovite schists, cross-bedded quartzites and conglomerates. The quartzites display scour structures, ripple marks and contain basalt intraclasts. Local flows of amygdaloidal and plagioclase-porphyritic basalt occur within a later shale sequence. The volcanics have been metamorphosed to low grade; however, medium grade sediments of the Wilson Island Group are seen further west in the Isles du Large (Hoffman *et al* 1977).

Union Island Group

Wedge shaped units of volcanic rock occur within a sequence of dark pyritic shale and dolomite. On the south shore of the Arm, basaltic lapilli-tuff breccias occur with subordinate porphyritic basalts (some containing 25% modal plagioclase) and bedded lapilli tuffs. Thin variegated lithic tuffs may occur locally (Mainland and Grapes Island localities, Fig. IX-1).

These units are overlain by a wedge of amygdaloidal basaltic pillows (up to 50 m thick) which is capped by massive basalt flows containing plagioclase phenocrysts. Some pillows show selvedges of partially palagonitised sideromelane. In thin section both lava types display skeletal plagioclase microlites (0.3 mm) set in a fine-grained chloritized matrix.

At the Inui Island locality (Fig. IX-1) there are over 600 m of amygdaloidal pillow basalt and pillow breccia. These lavas are texturally more varied than those to the south but commonly display a quench texture with 0.1 mm needles of plagioclase and chlorite.

Metamorphic alteration has led to the complete disappearance of fresh augite. The rocks are chloritized and carbonate occurs sporadically. The iron-titanium oxides commonly have been altered to sphene and pyrite. The absence of indicator minerals such as pumpellyite, prehnite and epidote is probably the result of a high activity of CO_2 in the metamorphic fluid which supresses these phases in favour of carbonate (Vallance 1969).

The sequence is intruded by columnar tholeiitic diabase and gabbro which form sills up to 200 m thick.

Seton Volcanics

This suite of volcanic rocks is found in several formations over a wide geographical area. The volcanic centres are concentrated along the northwest margin of the East Arm and along the MacDonald-Wilson Island Fault. The volume of volcanics decreases from west to east. Mapping was principally confined to the major volcanic areas at Seton Island, Pekanatui Point and Taltheilei Narrows.

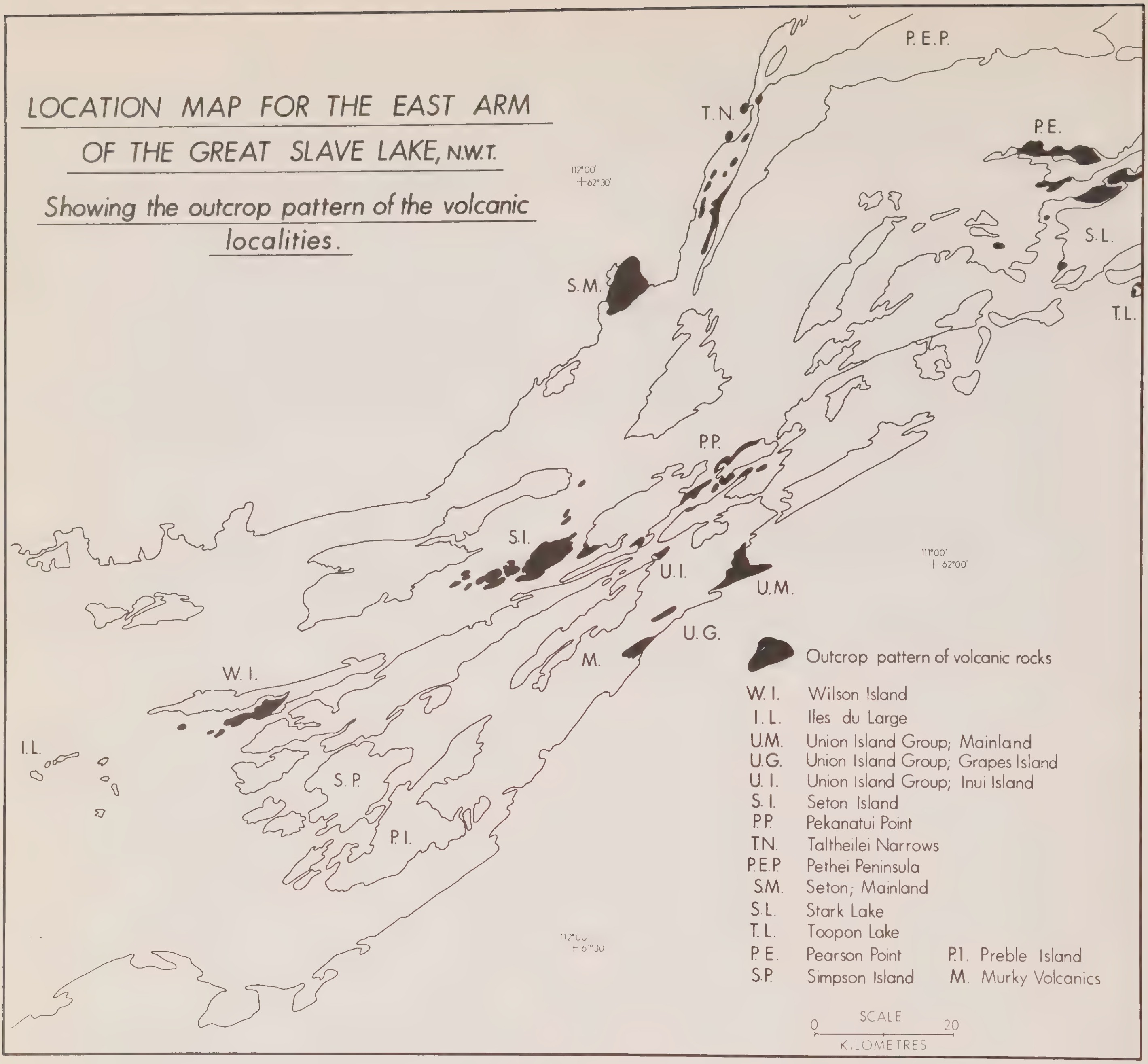

Figure IX-1: Location map for the East Arm of Great Slave Lake showing outcrop pattern of the volcanic localities

The basaltic lavas within this suite have been metamorphosed to a spilitic mineral assemblage of albite, chlorite and iron-titanium oxides plus varying amounts of quartz and carbonate with sporadic epidote (Olade and Morton 1972).

SETON ISLAND AREA:

A detailed stratigraphical column for the north side of Seton Island is given by Hoffman (1973). This area, along with the islands to the west and north and the previously unmapped south side of Seton Island, was remapped.

On the north of the island the sequence is contemporaneous with the Akaitcho River Formation (Hoffman 1968). At the base of the sequence is a plagioclase-porphyritic amygdaloidal basalt interlayered with coarse red lapilli and crystal tuff. Further east and higher in the succession basalt flows alternate with shale, sandstone, basaltic lapilli tuffs and with purple to green agglomerates containing fragments of porphyritic basalt and amygdaloidal rhyolite. The rhyolite fragments have a diameter of up to 1 m and may form 80% of the rock.

Towards the southwest of the island thickening of the rhyolitic agglomerate is accompanied by the appearance of prophyritic rhyolite fragments, some of which contain 40% feldspar phenocrysts. These beds lie stratigraphically above massive rhyolite flows which may be undisturbed, or locally brecciated and cut by tuffaceous veins. An earlier cycle of silicic volcanism is evidenced by the occurrence of rhyolite fragments in the oldest tuffs of the Seton Island area.

The younger basaltic flows outcropping in the east part of the island have brecciated flow tops, irregular hematite staining and a greater volume of thin, interlayered flows of amygdaloidal rhyolite. This association appears again further east on Keith Island, just below the Gibralter Formation.

The Seton Island tuffs are intruded by an albite-granophyre laccolith which forms a prominent intrusion on the north coast of the island.

Rhyolite domes form small islands to the north of Seton Island where they rest on sandstone of the Akaitcho River Formation (?). The domes appear to be contemporaneous with the rhyolite volcanism of Seton Island.

PEKANATUI POINT

At Pekanatui Point, 25 km east of Seton Island, younger localised sequences of volcanic rocks occur in the Upper Gibralter and McLeod Bay formations. The stratigraphy has not yet been compiled in detail, but at least one volcanic wedge is 400 m thick. The sequences consist of basaltic lapilli tuffs, cemented with dolomite, and coarse pillow breccias which are capped by massive pillow basalt in units of 8-20 m in thickness. Locally, there are massive K-feldspar-bearing spilite flows (altered trachy-andesites?) and rhyolite or pitchstone domes.

The volume of unbrecciated pillows increases westwards. Interlayered shales are locally green and black in colour. Mapping by Hoffman *et al.* (1977) has lead to the suggestion that these volcanic wedges may be contained in one, or possibly two, northeasterly elongated nappes.

The sequence is invaded by plagioclase-porphyritic diabase intrusives and quartz diorite laccoliths.

TALTHEILEI NARROWS

Along the northwest margin of the Arm eight tuff pipes outcrop mainly as islands in Hearne Channel, southwest of Taltheilei Narrows. The pipes, which range from 14 m to over 1/2 km in diameter, cut Sosan sandstones as well as Gibralter and McLeod Bay shales. The latter formations are locally brown to black in colour and contain bands and nodules of jasper as well and ankeritic sandstone bands as much as 15 cm in thickness. The pipes are composed of basaltic volcanic breccia and lapilli tuff which contain fragments of rhyolite and disrupted sandstone and shale. Rhyolite fragments locally form 50% of the rock, which also contains sporadic inclusions of basement granodiorite.

A section of bedded tuffs appears on the southwest side of the Pethei Peninsula. These occur in units up to 10 m in thickness and are interlayered with shales of the Gibralter and MacLeod Bay Formations. Interlayered with the youngest beds are basaltic lapilli tuffs, pillow breccias and comparatively fresh flows of amygdaloidal basalt. Some of the tuffs show cross-bedding; however, the thickest units are basaltic volcanic breccias and lapilli tuffs identical to those of the pipes. The pipes may have acted as feeders to these beds.

On a few of the islands in Hearne Channel, and further west on the Seton mainland section, aphyric and plagioclase-porphyritic basalt flows rest on Sosan sandstone which locally contains jasper layers.

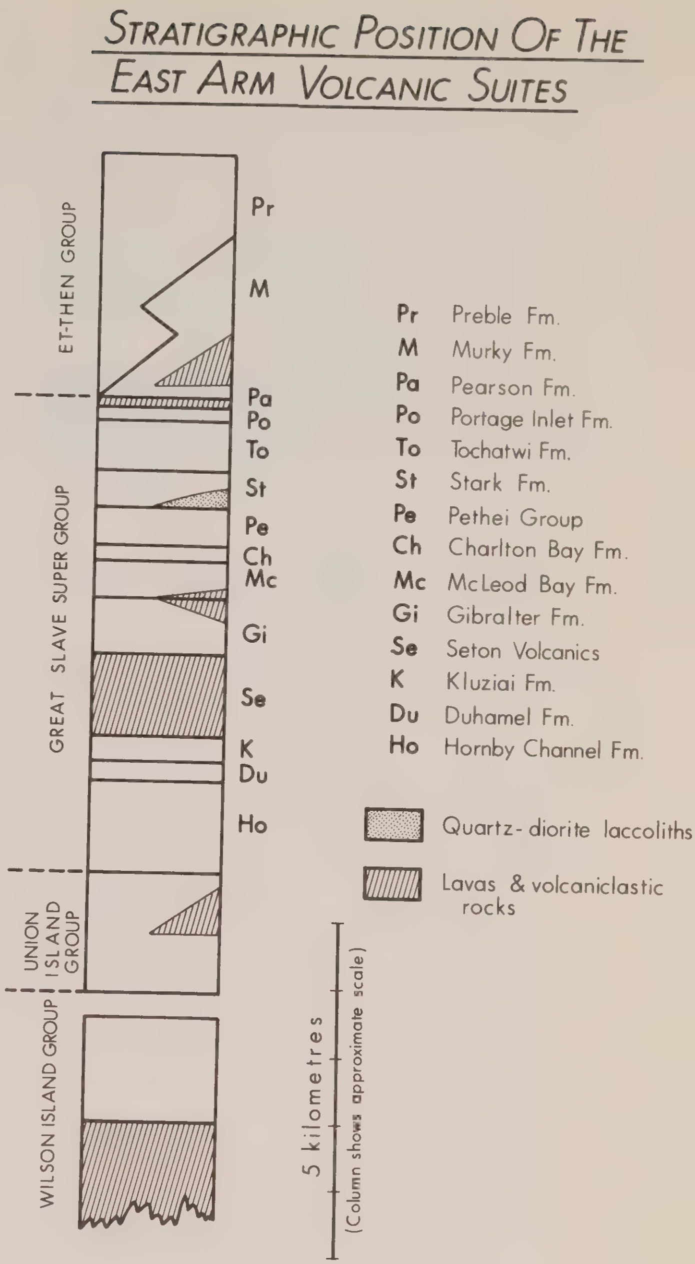

Figure IX-2: Stratigraphic position of the volcanic suites in the East Arm of Great Slave Lake

On the mainland this sequence is overlain by a series of rhyolite flows and rhyolitic crystal and lapilli tuffs and breccias. These are interlayered with red to black Gibralter shale and the whole sequence is cut by diabase intrusions and quartz diorite laccoliths.

STARK LAKE

One volcanic breccia pipe intruding Gibralter shale at the west end of Stark Lake and one Sosan-group tuff sequence, further south on Toopon Lake, were examined. The latter was studied in detail by Olade and Morton (1972) and tuffs were collected from this locality for U and Th analysis. Both localities are dominated by basaltic lapilli tuffs; keratophyric tuffs also occur at Toopon Lake. Hoffman *et al.* (1977) reported twelve basaltic volcanic breccia pipes in this area.

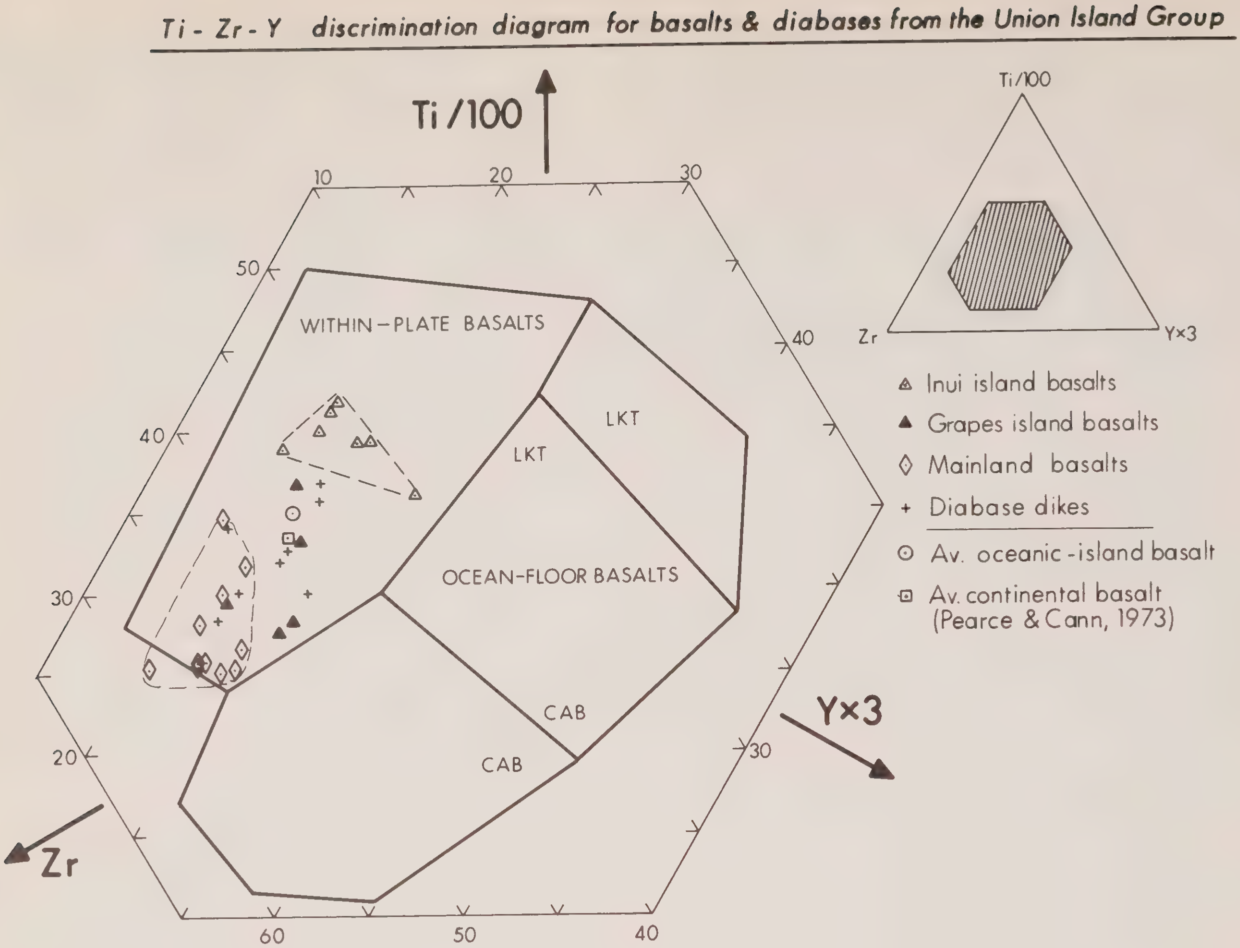

Figure IX-3: Titanium-Zirconium-Y discrimination diagram for basalts and diabases from the Union Island Group

Pearson Formation

This formation consists of 200 m of subaerial basalt flows each up to 20 m in thickness. The flows, which exhibit sporadic hematite staining and are uniformly amygdaloidal, have weathered flow tops and chilled flow bases. They are interlayered with red shales and brown siltstones which display ripple marks, dessication cracks and scour structures. Locally there are thin crystal tuff and crystal-lithic tuff layers. The formation overlies the brown shale of the Portage Inlet Formation. In thin section the lavas display skeletal and euhedral plagioclase ranging from 0.2 to 1 mm in length and remnant augite set in a felty groundmass of chlorite and plagioclase microlites. The plagioclase is commonly sericitized and locally contains epidote.

Murky Formation

Approximately 700 m of amygdaloidal basalts are interdigitated with continental Murky conglomerate at the western end of a peninsula. Here the oldest flows are commonly plagioclase-porphyritic and glomeroporphyritic, with phenocrysts up to 1 cm in size. Conglomeratic inclusions are common in the youngest flows which are also locally brecciated. All lava flows display an irregular hematite staining and the oldest flows are sometimes cut by epidote veins. A similar outcrop of Murky flows is reported by Hoffman (pers. comm.) on the south side of Preble Island.

CHEMISTRY

The only published chemical analyses of lavas from the East Arm are those of Olade and Morton (1972) who analysed a single basaltic flow unit from Seton Island. The analyses show spilitic compositions with high Na_2O and varied K_2O, although a few potassic spilites with over 3% K_2O were found.

Mainly on the basis of Ti and Zr contents, Olade (1975) considered these lavas to be altered oceanic-island basalts. A more extensive study of Seton volcanism is planned to test this conclusion, but at the present time only the Union Island Group has been fully analysed. A brief summary of the conclusions from the major and trace element data are given below.

MAJOR ELEMENTS

The basalts have a spilitic character, specifically containing high H_2O and CO_2 (up to 7.94 and

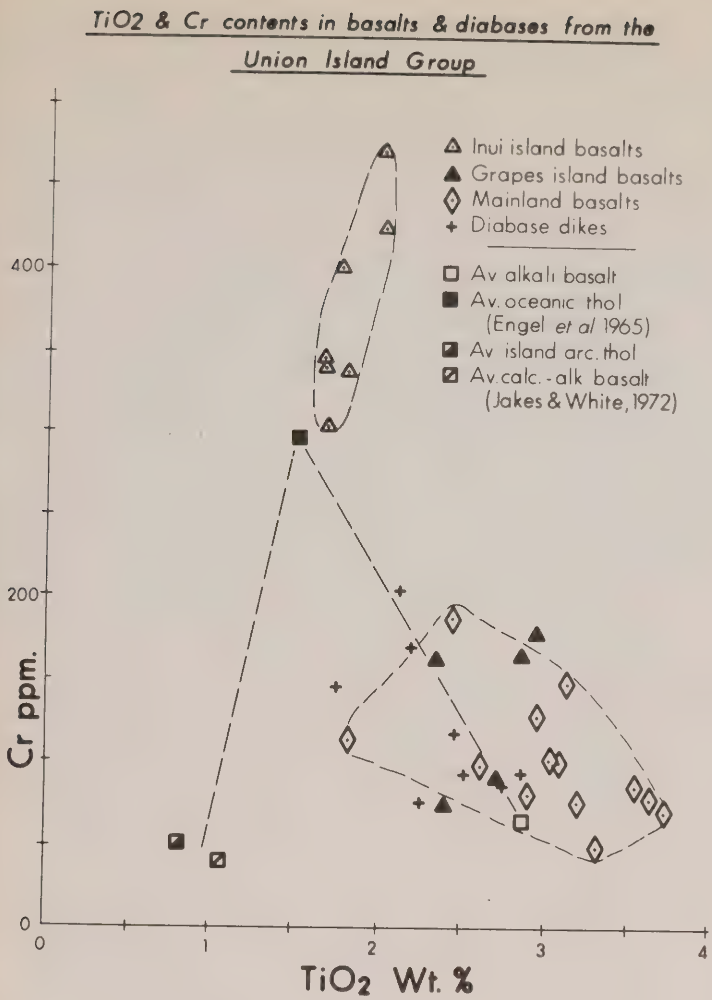

Figure 4: Titanium Dioxide and Chromium content of basalts and diabases from the Union Island Group, East Arm, Great Slave Lake

6.49 weight % respectively) and extremely variable alkali, calcium and silica contents (e.g. 0.29 - 3.63% K_2O; 0.44 - 10.50% CaO; 37.99 - 59.25% SiO_2). This variation is commonly observed within a single outcrop and may reflect an original difference in glass content and varying permeability towards the metamorphic fluid.

TRACE ELEMENTS

The relatively stable trace elements Ti, Zr, Y, Nb and Cr have been used to identify the original lava types and their associated tectonic environment, following the techniques of Pearce and Cann (1973), Bloxham and Lewis (1972) and Pearce (1975).

All the Union Island Group lavas studied are characteristic of the within-plate basalt types of Pearce and Cann (1973). Chemically they are similar to modern basalts extruded at localized centres on oceanic islands or continents (Fig. IX-3). The field evidence shows the group to be ensialic and therefore representative of modern continental basaltic volcanism (Goff and Scarfe 1976). Figure IX-4 shows that the basalt types are clearly not calc-alkaline and that the mainland group has an alkalic character, while the thick pillowed wedge to the northwest displays a strongly tholeiitic affinity. This latter unit is notably primitive for a continental basalt and is comparable in its trace elements to the Tertiary basalts of the Svartenhuk peninsula of W. Greenland which are associated with continental rifting (Clark 1970; O'Nions and Clark 1972).

Thus the Union Island Group basalts, which display plagioclase as a liquidus phase and show no evidence of having been fractionated at depth, would appear to represent partial melting in two stages: firstly, below a continental crust of normal thickness, and secondly, below an extensively thinned crust. This sequence of events would be expected during the rifting of continental crust leading to the incipient development of an ocean basin. The rift subsequently closed before any development of oceanic crust could take place. This interpretation is in broad agreement with the tectonic model proposed by Hoffman *et al.* (1974).

RELATIONSHIP BETWEEN VOLCANISM AND URANIUM MINERALIZATION

Two considerations are pertinent to the genesis of uranium in the East Arm. First, stratabound uraninite and hematite deposits in Hornby Channel Formation sandstone (Walker 1971) on Simpson Island, are near bostonite breccia pipes. Secondly, at Toopon Lake, devitrified Seton tuffs occur less than a 100 m stratigraphically above uraninite mineralization in the Kluziai sandstone (Olade 1972). In both cases volcanism may have been a possible cause of the remobilization of uranium from the Archean basement, or from the host sandstones (Grieg 1971). Furthermore, Olade (1972) has drawn an analogy between the Toopon Lake occurrence and the Colorado Plateau type of mineralization, suggesting that the tuffs themselves may have acted as a source of uranium, the metal being released as a result of low grade regional metamorphism.

These suggestions were investigated in the field by means of gamma-ray scintillometer surveys. The surveys were concentrated on sediments both in contact and interlayered with lavas and tuffs from all groups. The readings were then compared to background values for any given sediment. No significant spatial correlation between the volcanic rocks and uranium mineralization was detected.

Olade's model will be tested by a laboratory study of Seton tuffs using gamma-ray spectrometry to determine their eU and Th contents. If uranium has been leached from the tuffs during devitrification, they should display low U/Th ratios when compared to the associated lavas.

CONCLUSIONS

(a) All the major Aphebian volcanic centres of the East Arm have been mapped in detail on a scale of 1:50,000. Sections have been measured in all the main sequences and a detailed facies correlation is being carried out.

(b) The most important volcanogenic episode, represented by the Seton volcanics, has been found to range in age from the Akaitcho River Formation of the Sosan Group to the MacLeod Bay Formation. Volcanism appears to be localised at several isolated centres

and was predominantly basaltic and rhyolitic throughout, though there are some intermediate compositions.

The Seton volcanics show considerable variation in volcanic style.

(c) No general spatial correlation could be found between volcanism and uranium mineralization.

(d) All lavas have been affected by very-low to low-grade metamorphism. The absence of indicator minerals of these metamorphic grades in the Union Island Group and the Seton volcanics may be caused by a high activity of CO_2 during metamorphism.

(e) Comparison of immobile trace elements in the Union Island Group lavas with those in modern basalts suggest that Union Island lavas are similar to modern continental basalts often associated with continental rifting. This interpretation is in agreement with the model for the origin of the East Arm as the failed arm of a triple-rift system.

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STRATIGRAPHIC AND PALEOENVIRONMENTAL ANALYSIS OF THE SEKWI FORMATION, MACKENZIE MOUNTAINS, NORTHWEST TERRITORIES

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TOPIC OUTLINE

I. The Sekwi Formation defines a coastal plain to continental shelf to continental rise sedimentary sequence.

II. Five major lithofacies outline the shelf-slope transition.

III. Lead/zinc mineralization is not extensive and, with the exception of late stage dolomitization is not consistently related to any specific depositional, diagenetic or structural features.

ABSTRACT

Lower Cambrian units and the Sekwi Formation exposed in the central and western Mackenzie Mountains, can be described in terms of five major depositional regimes.

(1) Slope Deposits: dominantly finely laminated shale with interbedded siltstone, debris flows, slumps, soft-sediment deformation structures, rotated and aligned nodules, load casts, injection structures and extensive bioturbation.

(2) Oolite Shoal Deposits: oolitic, oncolitic, bioclastic packstones and grainstones which can be further subdivided on the basis of predominant bedform into two subfacies, A and B. Subfacies A is characterized by plane parallel beds, is typically developed at the base of the oolite facies, and is occasionally interbedded with bioturbated horizons and/or archeocyathid/renalsoid boundstones. Interpreted as a product of relatively deep or low-energy conditions of deposition, Subfacies A is always succeeded by high-angle cross-bedded lithologies of Subfacies B which reflect higher energy conditions and constant agitation.

(3) Clastic Deposits: interbedded sandstones, siltstones and shales of tidal and nearshore origin. *Skolithos* and *Cruziana*, herringbone cross stratification and lenticular bedding are common in this facies.

(4) Shallow Subtidal/Intertidal Deposits: alternating limey and marly beds interbedded with storm deposits, lag conglomerates and archeocyathid/renalsoid boundstones.

(5) Tidal Flat Deposits: predominantly finely laminated dolomitic stromatolites; mudcurls, mudcracks, intraclasts, saltcasts, solution collapse breccias, tidal channels and oscillation ripples are characteristic.

Detailed examination of 22 stratigraphic sections, covering an area of 60,000 km^2, indicates that in a transit towards the west the five major lithofacies are representative of a coastal plain to continental shelf to continental rise sedimentary sequence formed on a gently subsiding trailing edge structure. The shelf edge was defined by an extensive oolite shoal and not an organic reef as suggested in previous interpretations. Mineralization of the Sekwi Formation, in the sections examined is not extensive and, with the exception of late stage dolomitization, is not consistently related to any specific depositional, diagenetic or structural features.

INTRODUCTION

In recent years the Mackenzie and Selwyn Mountains have been the locus of an intense exploration effort for base metals by Canada's mining industry (Brock, 1975a, b). The Cambrian Sekwi Formation has been the target for much of this activity because innumerable occurrences of lead-zinc mineralization have been reported in this unit. The purpose of this study, undertaken under the sponsorship of the Department of Indian Affairs and Northern Development is two-fold: to describe the sedimentologic and stratigraphic parameters that define the Sekwi Formation and, secondly, to determine if in the Sekwi Formation specific associations exist between depositional and/or diagenetic rock type and lead-zinc mineralization. Information included in this report is based on detailed mapping of 22 stratigraphic sections within an area of approximately 60,000 km^2 in the western and central Mackenzie Mountains (Fig. X-1). The area includes lower Cambrian units 10A, 12, 13 and the Sekwi Formation as shown on geological maps 105-P, Sekwi Mountain (Blusson, 1971); 106-A, Mt. Eduni and 106-B Bonnet Plume (Aitken and Cook, 1974; Blusson, 1974); 105-O Niddery Lake and 106-C Nadaleen River (Blusson, 1974); 105-I, Nahanni (Green, Roddick and Blusson, 1967); 95-L, Glacier Lake and 95-M, Wrigley Lake (Gabrielse, Blusson and Roddick, 1973); 96-D, Carcajou Canyon (Aitken and Cook, 1974). The distribution of the Sekwi, Backbone Ranges and Mount Cap Formations is shown in Fig. X-2.

The stratigraphic framework in use at the present time for the area covered by this report has been established in regional geologic mapping by Aitken *et al.*, 1973; Aitken and Cook, 1974; Blusson, 1971, 1974; and Gabrielse *et al.*, 1973. Lower Cambrian rock units of the Mackenzie Mountains comprise the Sekwi Formation (Handfield, 1968; Gabrielse *et al.*, 1973), the Mount Clark Formation (Williams, 1923; Aitken *et al.*, 1973, p. 24-25), and the Mount Cap Formation (Williams, 1922; 1923, p. 76B-77B; Aitken *et al.*, 1973, p. 27-29). Lower Cambrian sedimentation in this area was controlled by a paleotectonic high, the Mackenzie Arch (Aitken *et al.*, 1973, p. 14, figs. 3, 5); it separates the Backbone Ranges and Sekwi sediments deposited on the western flanks of the arch from the Mount Clark and Mount Cap sediments deposited on its eastern flanks. The Backbone Ranges and Mount Clark Formations consist predominantly of clastic sediments derived from the Mackenzie Arch and are conformably overlain by carbonate and clastic sediments of the Sekwi and Mount Cap Formations. The Sekwi Formation, named and described by Handfield (1968), crops out as an arcuate belt in the central

Figure X-1: Index and locality maps. Locality map displays location of stratigraphic sections used in this report.

and western Mackenzie Mountains. Extensive biostratigraphic analysis by Fritz (1972, 1973, 1974, 1975a, b) has shown conclusively that three trilobite zones, *Fallotaspis, Nevadella* and *Bonnia-Olenellus* (Fritz, 1972, p. 3), all belonging to the Lower Cambrian, occur within strata assigned to the Sekwi Formation. Handfield (1969, 1971) has described coral like fossils and Archeocyatha of middle and late lower Cambrian age collected from the Sekwi Formation.

In a preliminary analysis of depositional facies in the Sekwi Formation Fritz (1976a, b) recognizes a shelf to basin transition, in a westward direction, for the general area covered in this study. Read (1976) in a study of Lower Cambrian sedimentation in the Pelly Mountains, Yukon Territory, documents large (100 m high) archeocyathid-renalsoid bioherms in rocks correlative and possibly equivalent to the Sekwi Formation.

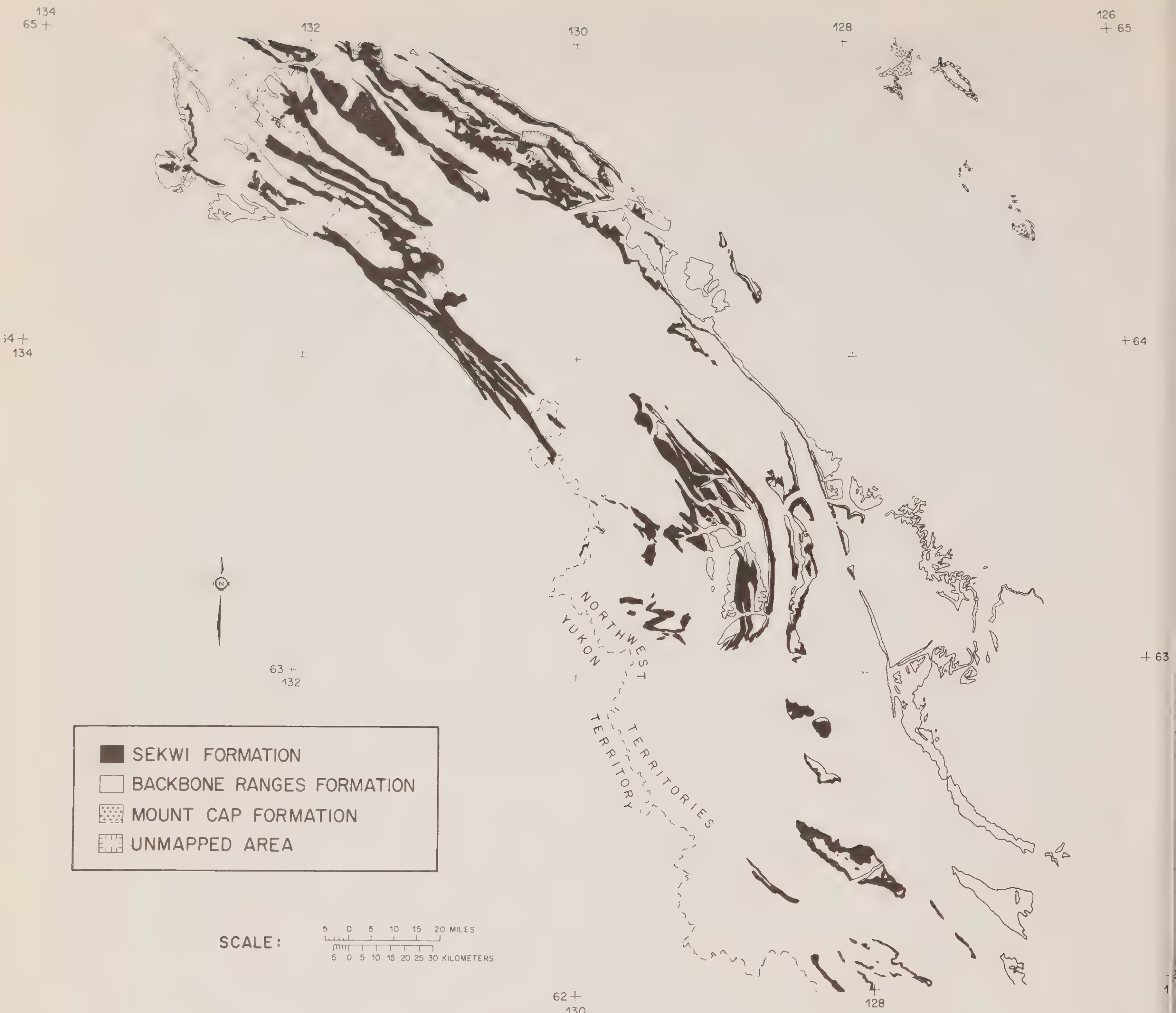


Figure X-2: Distribution of Backbone Ranges, Sekwi and Mount Cap Formations in the central and western Mackenzie Mountains compiled from Geological Survey of Canada Open File Reports 205 (Blusson, 1974), 221 (Aitken and Cook, 1974), Memoir 366 (Gabrielse, Blusson and Roddick, 1973), Paper 74-13 (Aitken and Cook, 1974) and Map 8-1967 (Green, Roddick and Blusson, 1967), Paper 71-22 (Blusson, 1971).

Important aspects of regional stratigraphy and structure of the Mackenzie Mountains and adjacent regions are summarized by Aitken, 1975; Aitken and Cook, 1974; Aitken *et al.*, 1973; Brabb, 1967; Douglas *et al.*, 1970; Eisbacher, 1974, 1976a, b, 1977; Gabrielse, 1967; Norris, 1972, 1974, North, 1971; Taylor and Stott, 1973; Tempelman-Kluit and Wanless, 1975; Tempelman-Kluit *et al.*, 1974, 1976, 1977; Yorath and Cook, 1972. Discussions of Cordilleran evolution in terms of plate tectonics are presented in Churkin, 1974; Cook and Taylor, 1975; Maxwell, 1974; Monger *et al.*, 1972. Aspects of stratabound lead-zinc mineral deposits of the northern Canadian Cordillera are considered by MacQueen and Taylor (1974); Taylor *et al.*, (1975); Thompson and Panteleyev (1976).

GENERAL STRATIGRAPHY

The Sekwi Formation at its type locality immediately north of June Lake, consists of a sequence of interbedded shales, siltstones, sandstone, limestones, and dolostones approximately 750 m (2,000 ft.) thick. The lower 305 m (1,000 ft.) of the formation include the *Fallotaspis* and *Nevadella* zones of the Lower Cambrian (Fritz, 1972, p. 3, fig. 3) and consist of a basal brown shale and siltstone that gradually becomes more calcareous with the appearance of aligned, blue-grey weathering limestone nodules that ultimately are overlaid by banded yellow and blue-grey weathering limestones. The interval is typified by several isolated debris flows. Following are 460 m (1,500 ft.) of sediments belonging almost exclusively to the

Bonnia-Olenellus zone (Fritz, 1972, p.3, fig. 3). The lowermost part of this interval is a cream weathering cross-bedded sandstone that grades upwards into mudcracked, brown weathering shales. The shales are succeeded by 360 m (1,200 ft.) of orange weathering, cryptalgal laminated dolostone and grey weathering, nodular and bioturbated limestone in alternating beds of variable thickness. The Sekwi Formation at June Lake is part of the overturned east limb of an anticline that plunges to the south. The section is cut by small normal faults with an average displacement of 46 m (150 ft.) and is sliced by several low-angle thrust faults.

The Sekwi Formation overlies and interdigitates with the Backbone Ranges Formation. This interpretation is confirmed by the sedimentology, described in this report, and the biostratigraphic relationships established by Gabrielse *et al.* (1973, p.34, 37, figs. 7, 15). The Sekwi Formation has been divided into five basic lithologic units which can be easily recognized throughout the study area (Fig. X-3). Each unit represents a unique complex of depositional environments.

SEDIMENTOLOGY OF THE SEKWI FORMATION

On the basis of detailed field examination and analysis of thin sections and peels in the laboratory five major depositional regimes have been recognized within the Sekwi Formation and the immediately underlying Backbone Ranges Formation. For greater clarity in presentation each regime is discussed below in terms of objective evidence followed by interpretation. Where mineralogic or microfabric data are presented initial field and petrologic observations have been confirmed by both X-ray diffraction and Analytical Scanning Electron Microscopy. The carbonate rock classification scheme used is that of Dunham (1962). The stratigraphic distribution of each regime is illustrated in Figure X-4.

TIDAL FLAT DEPOSITS

Figure X-5 - 1, 2, 3, 4, 5, 6; Figure X-6 - 1, 2, 3, 4, 5; Figure X-7 - 1, 2, 3, 4, 5, 6.

EVIDENCE

These rocks belong to Unit A and consist predominantly of muddy dolostones, limestones and a lesser

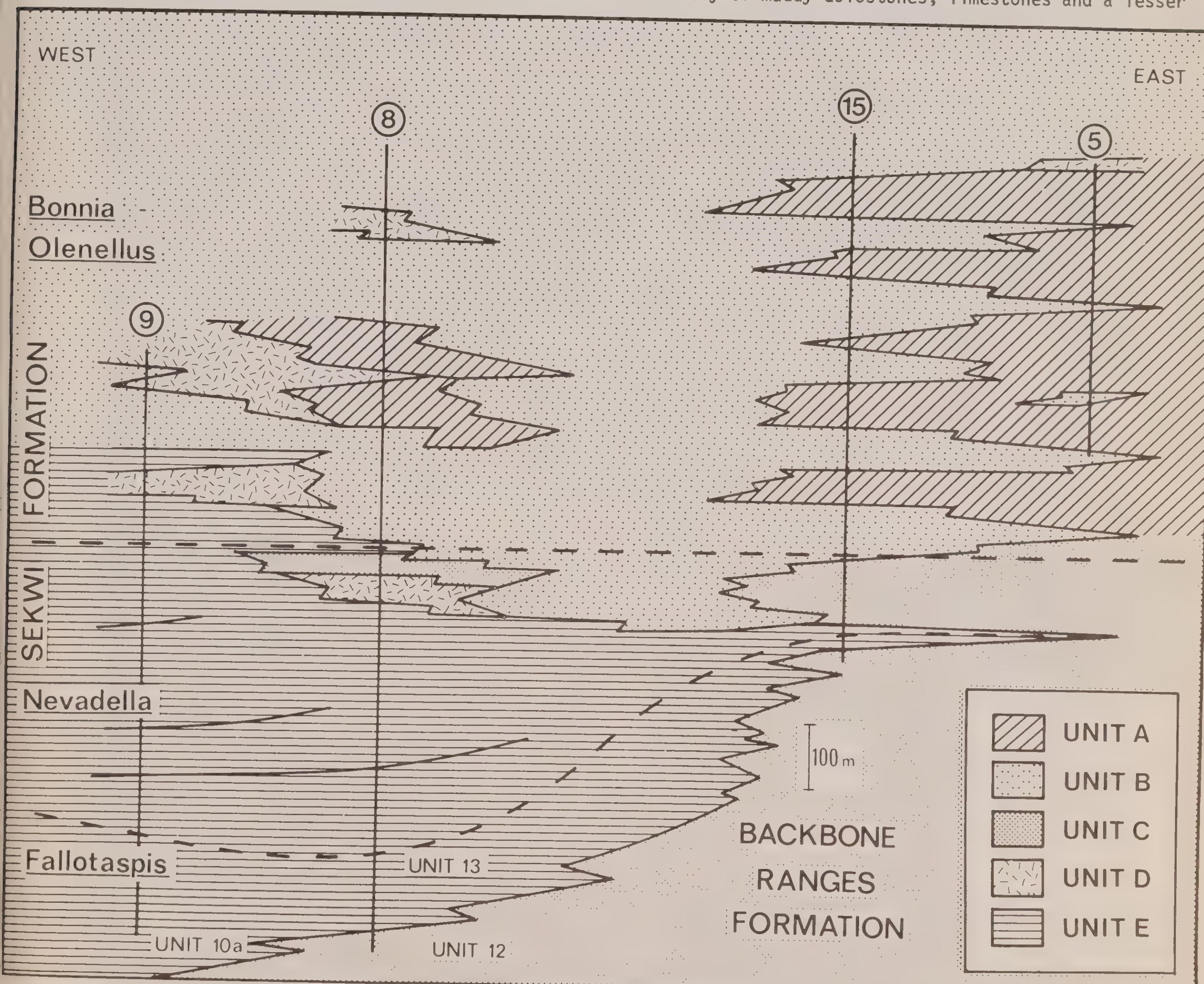


Figure X-3: Stratigraphic cross section through the Sekwi and Backbone Ranges Formations, sections 5, 15, 8 and 9 showing informal units A-E referred to in text. Horizontal datum plane top of *Nevadella* zone.

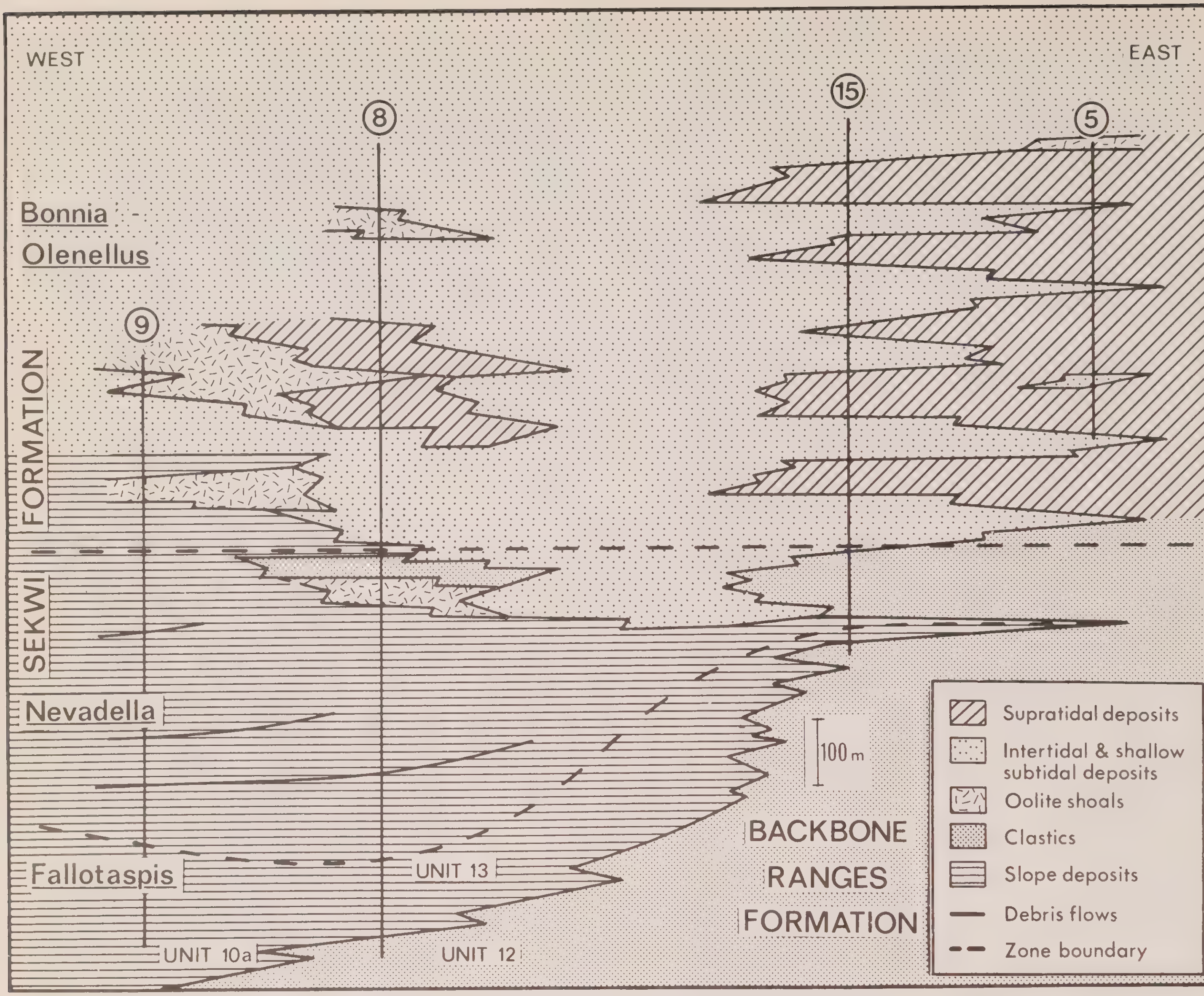


Figure X-4: Cross section through Sekwi and Backbone Ranges Formations showing interpreted environments of deposition. This figure is drawn on the same base as Figure X-3.

fraction of sandstones, siltstones, and shales. The dolostones and limestones characteristically display cryptalgal fabrics (Aitken, 1967, p. 1163), dessication cracks, stromatolites, curled cryptalgal laminates, flat pebble conglomerates, intraclasts, *Skolithos*-like burrows, channels, fenestral textures (laminar and bird's eye), oscillation ripples with and without dessication cracks and lingoid ripples with superimposed rill marks, Runzel marks and *Salterella* coquinas. Also found are oncolitic wackestones, with a burrowed matrix and oolitic packstones, wackestones, and grainstones characteristically with parallel laminations. In addition, bioturbation fabrics are abundantly preserved.

The sandstones are frequently coarse to medium grained. They occur in channels, sandwiched in between dessication cracks, surrounding intraclast breccias and associated with *Skolithos* burrows and a variety of animal trails and other burrows. The sandstones commonly display trough, planar-tabular and herringbone corss stratification. The shales and siltstones are most frequently interbedded with sandstones and dolostones. Dessication cracks are commonly preserved and salt casts, anhydrite and solution collapse breccias occur locally. Bioturba-

Figure X-5:

1. Cryptalgal laminated dolostone. Unit A. Section 16.

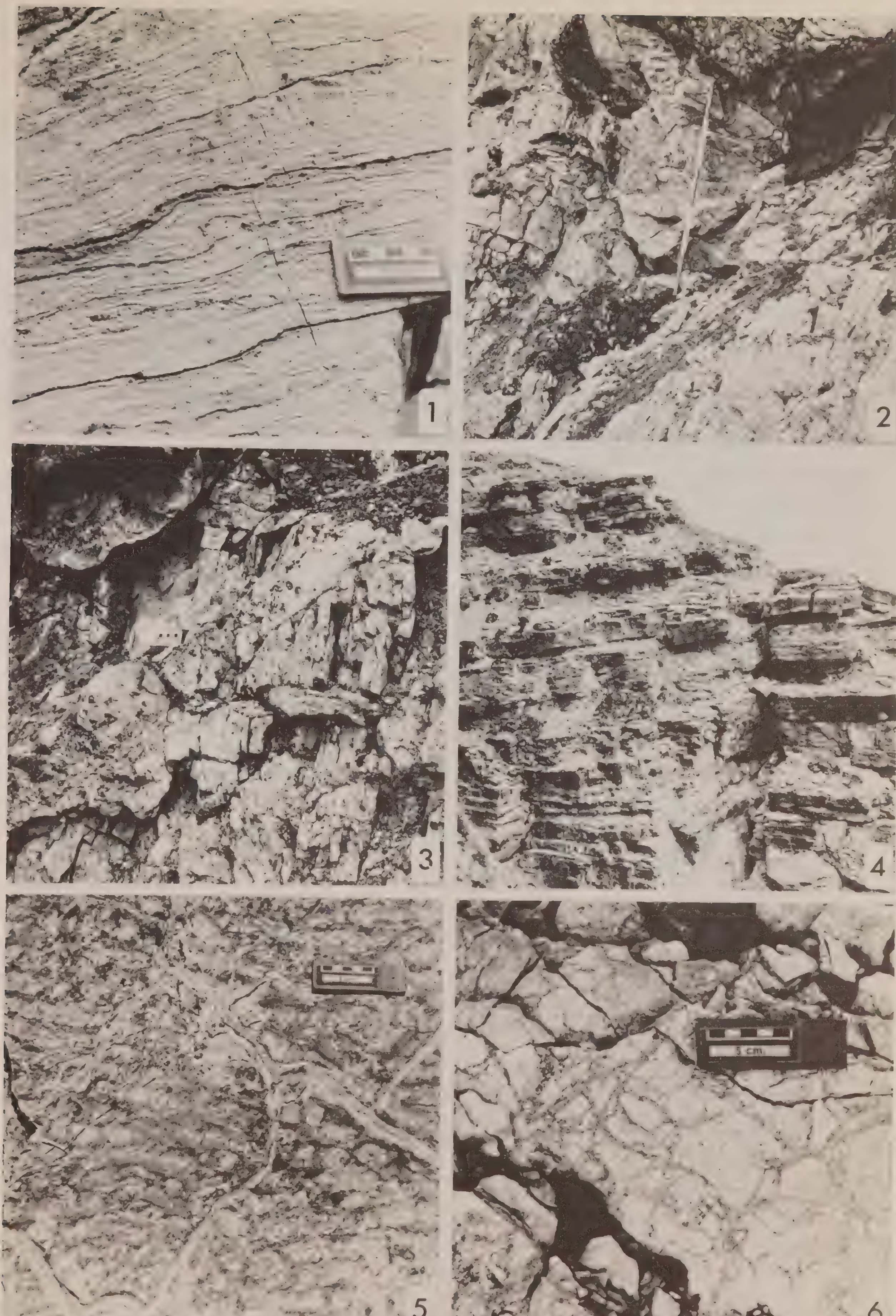
2. Pogo stick leaning against orthoquartzite infilling sinkhole in underlying arenaceous dolostone. Unit A. Section 1. Pogo stick 1.5 m long.

3. Orthoquartzite infilling karsted arenaceous dolostone of Unit A. Section 1. Scale 5 cms long.

4. Cryptalgal dolostone and dolomitic shale cycles, 0.25 m to 1.5 m thick, in deposits of Unit A. Section 5.

5. Dolostone with mudcracked and rippled surface. Unit A. Section 18.

6. Dolostone intraclasts and sand filled mudcracks on bedding. Unit A. Section 16.



tion fabrics, trails, and burrows are also abundantly preserved in the shales and siltstones.

INTERPRETATION

Similar sedimentary features to the ones described have been recorded from Recent tidal flat environments and from other ancient deposits interpreted as tidal flat deposits. The literature documenting tidal flats is very extensive. Comprehensive descriptions for carbonate depositing environments can be found in Bathurst (1971). Roehl (1967) presents a comparative analysis of Recent tidal flats from the Bahamas and Siluro-Ordovician tidal flat deposits from the subsurface of the Williston Basin. Shinn *et al.* (1969) discuss tidal flat deposits of Andros Island, Bahamas; Ginsburg (1975) presents a collection of papers of ancient and modern examples; Logan *et al.* (1970, 1974) document Recent deposits from Shark Bay, Western Australia; Kendall and Skipwith (1969), and Purser (1973) discuss tidal flat examples and dolomite and evaporite deposition along the western margin of the Persian Gulf. Detailed reviews of terrigenous clastic tidal flats can be found in Reineck (1972) and van Straaten (1954).

Extensive tidal flats tend to develop in areas sheltered from attack by waves, viz., behind barrier islands or by position in an embayment. Muddy sediments form extensive deposits in this environment because of the inshore decrease in tidal current velocity combined with the action of settling and scourlag (van Straaten and Kuennen, 1958, p. 408-409).

The tidal watershed in Recent environments is characterized by a well-developed network of channels and creeks. In fact, it is a geomorphic fingerprint of a Recent tidal flat, yet tidal channels and creeks are rarely recorded in older sediments such as those of the Sekwi Formation. Active intertidal channels migrate rapidly across the flat. Rates of 25 m/yr for mud flats, and rates of 30 m/yr-100 m/yr for sand flats, have been recorded in the North Sea tidal deposits (Reineck and Singh, 1973, p. 365). Rapid lateral migration of Recent tidal channels tends to produce a sedimentary sequence characterized by a basal scour surface with a lag conglomerate. Tidal point bar deposits cap the conglomerates and are typified by herringbone and trough cross-stratified sands, flaser bedding, alternating layers of sand and mud with bedding inclined towards the channel and abundant slump structures. The point bar deposits are ultimately capped by bioturbated muds. In environments restricted to carbonate deposition, the coarser fraction is very thin or missing from the point bar deposits. The deposits consist of a lag conglomerate topped by a sequence of muddy sediments with root and bioturbation traces. The deposits are commonly capped by algally laminated and mudcracked sediments.

Within the Sekwi Formation, dessication cracks, upcurled cryptalgalaminites and intraclasts are all evidence for subaerial exposure. Other characteristic features of very shallow water and features associated with falling water level and intermittent subaerial emergence are rill marks, wrinkle marks or Runzel marks, ripples with dessication cracks, and ripples with rounded crests. The thicker sandstone units with large-scale cross bedding probably originated in a tidal channel.

The interaction of blue-green algae, sediment, and diagenesis produces fabrics to which Aitken (1967, p. 1163, 1170-1171) applies the term 'cryptalgal', because in most instances, the influence of algae in the rock is inferred rather than observed. Cryptalgal fabrics recorded in Unit A of the Sekwi Formation and assigned to a peritidal regime consist of cryptalgalaminites, stromatoids, oncolites, intraclasts with cryptalgalaminations, upcurled cryptalgalaminites, and fenestral fabrics. The restriction of blue-green algae to the peritidal regime appears to be the result of competition with other plants and animals, as suggested by Garrett (1970, p. 171-173). However, in instances where the environment excludes the competing organisms, as is the case in the hypersaline lagoons of Shark Bay, western Australia, blue-green algae flourish in a subtidal setting. The common association of dessication cracks, upcurling of cryptalgalaminites, fenestral textures, halite casts and selective and very fine grained dolomitization of cryptalgal fabrics with the rocks of Unit A indicate a peritidal rather than a subtidal setting. Furthermore, the burrowed siltstones, shales, and carbonates described here are parallelled by deposits of 'high tidal flats' in Holland (van Straaten, 1954), the 'higher mud flats' in the Wash (Evans, 1965), and in the Bahamas and Florida (Shinn, 1968).

SHALLOW SUBTIDAL AND INTERTIDAL DEPOSITS

Figure X-8 - 4, 5, 6; Figure X-9 - 1, 2, 3, 4, 5.

EVIDENCE

Sediments thought to represent a shallow marine environment are characteristic of Unit B. The rocks in outcrop are typically banded and consist of yellow, silt and clay-rich seams, approximately 3 cm thick alternating with blue-grey limestone bands averaging 5 cm in thickness. Ripple cross lamination, parallel and wavy laminations, small-scale scours, *Salterella* coquinas, burrowing bioturbation, trails and tracks, soft sediment deformation, sedimentary boudinage, interbeds 5-10 cm thick of intraclastic debris, occasional interbeds of rippled oolitic sands 10-15 cm thick, as well as ripple- and parallel-laminated quartz silt and sand bands 5-10 cm thick, mounds 1-1.5 m with a *Renalcis*-like frame, and small archeocyathid-algal bioherms 0.5-1.5 m thick are characteristic sedimentary features of these sediments. Although the rocks belonging to this facies are predominantly calcareous mudstones and wackestones, occasional calcareous packstones and grainstones, as well as, sand, silt, and shale interbeds are present.

Figure X-6:

1. Large scale cross bedding in tidal channel deposits of Unit A. Hammer in middleground 30 cm long. Section 16.

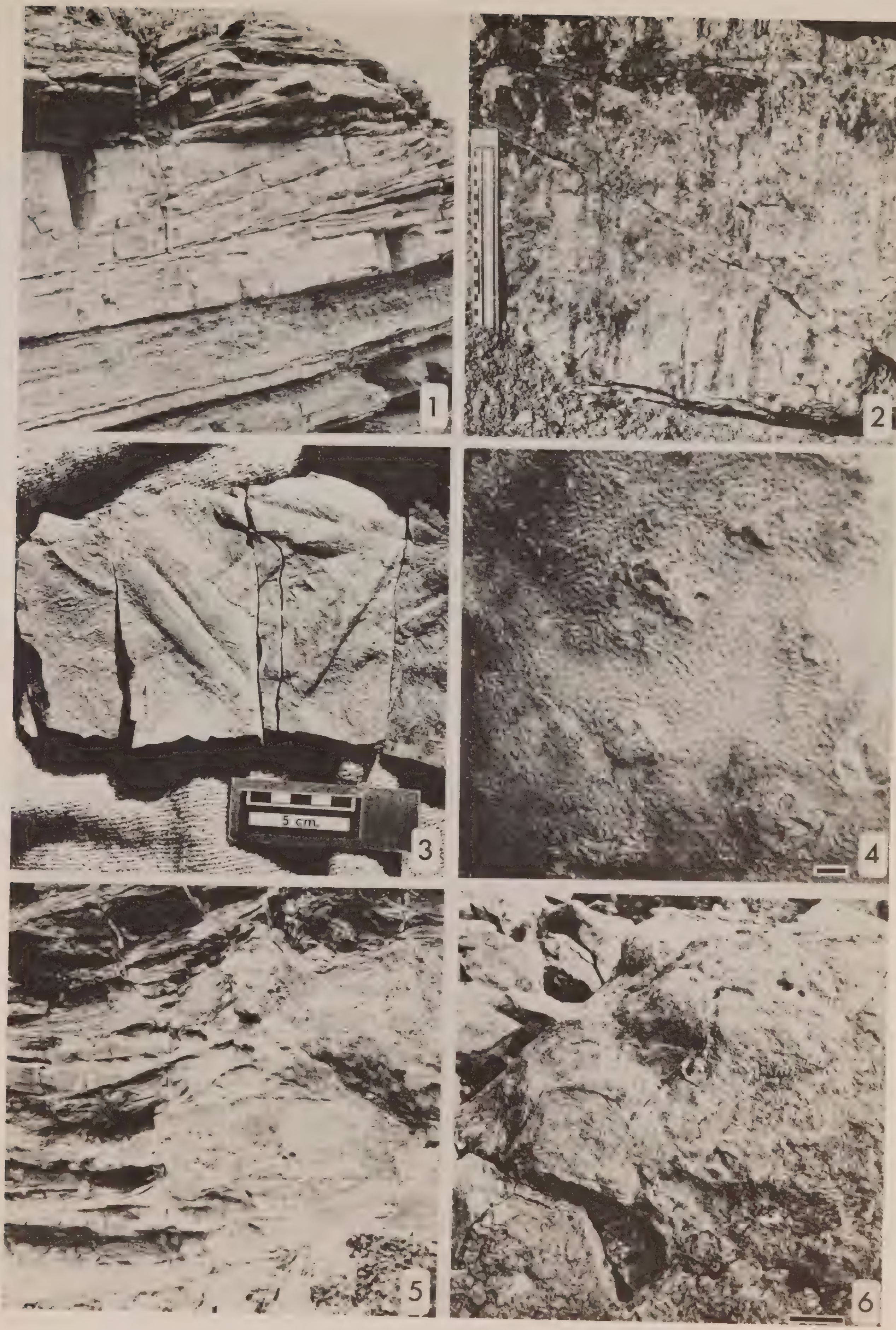
2. *Skolithos* burrows cutting across tabular cross bedded orthoquartzite of Unit A. Section 8.

3. Mold of trilobite furrowing (*Cruziana*) and walking tracks (*Diplichnites*) in fine grained sandstone bed of Unit C. Section 18.

4. Wrinkle marks (Runzel marks) in cryptalgal dolostone of Unit A. Scale 1 cm long. Section 8.

5. Algal mound 0.90 m thick interdigitating with flanking sandy deposits. Unit C. Section 17. Mound 60 cms high.

6. Archeocyathid-*Renalcis* boundstone. Note domal heads. Unit D. Section 8. Scale 5 cms long.


1
2
5 cm.
3
4
5
6

Sedimentary features which characterize the clastic units are wavy and plane-parallel laminations, low-angle cross stratification, ripple cross lamination and abundant burrows, tracks, and trails.

INTERPRETATION

The occurrence of fine-grained sediments laterally equivalent to small oolite shoals suggests that the general environment was sheltered. The occasional lack of bioturbation which allows preservation of extremely fine sedimentary detail such as wavy-parallel and cross laminations and the occurrence of thick coquina beds of the organism *Salterella* also suggests that the environment was restricted. Organisms in a normal marine setting tend to burrow actively and churn the sediments destroying most features of hydrodynamic character leaving a strong overprint of biologic origin. Bioturbated fabrics in similar rocks elsewhere in the section indicate that burrows and mud-dwellers had already evolved by this time in the organic record. The dominant physical controls on organic activity in a marine environment are salinity and temperature. In Holocene environments of carbonate deposition, salinity appears to be the governing control on the distribution and diversity of organisms. In coastal lagoons of the Persian Gulf and in Shark Bay, western Australia, hypersaline conditions are maintained by barriers which prevent circulation of waters with oceanic salinity and also prevent constant resupply of waters lost by evaporation. The number of species living in these lagoons is low but the number of individuals is very large - a situation parallel to that of the *Salterella* faunas in the Sekwi Formation.

The occurrence of interbedded deposits indicating higher energy states, such as oolitic intraclastic sediments with large ripples, and small-scale debris flows, implies that these deposits accumulated in a setting below 'normal' wave base. However, interbeds of renalsoid-archeocyathid boundstones indicate that the general environment was characterized by shallow-water conditions and that the oolitic-intraclastic sediments and small-scale debris flows represent re-sedimented material generated during storms.

OOLITE SHOALS

Figure X-6 - 6; Figure X-8 - 1, 2, 3.

EVIDENCE

Two subfacies can be recognized in the deposits of Unit D, one consists of cross-bedded oolitic and pisolitic grainstones and packstones (Subfacies A), the other comprises plane-parallel bedded oolitic grainstones and packstones and bioturbated interbeds with bioclastic debris as well as archeocyathid-renalsoid boundstones (Subfacies B).

INTERPRETATION

Holocene marine ooids require a shallow-water environment with frequent agitation for their formation; these conditions are found at shelf edges and tidal inlets. Oolitic sediments are common in the Sekwi Formation. Where they occur interbedded with tidal flat and cryptalgal sediments it has been assumed that they reflect a tidal inlet origin. Oolitic sediments of Unit D are important in defining the nature of the Lower Cambrian shelf edge in the area of study.

The ease with which ooids are transported from their point of formation in Recent environments to accumulate in other environmental settings such as eolian dunes, beach deposits or even deep basinal deposits, suggest that care should be exercised in their interpretation (Ball, 1967, p. 571; Loreau and Purser, 1973, p. 321). It is necessary to study the associated sediments, the sedimentary features, and related diagenetic fabrics. Oolitic sands in slightly deeper water in the Bahamas are burrowed and not as well sorted as the deposits on bar and ridge crests (Ball, 1967, p. 571). They tend to make extensive blankets admixed with carbonate mud and pelleted sediments away from the bars and ridges. Oolitic beds in the lowermost portions of Unit D possess plane-parallel stratification and are interbedded with bioturbated sediments suggesting deposition under low-energy conditions in slightly deeper water than the overlying deposits. The sedimentary sequence in the sandbars and ridges of the Bahamas consists of spillover lobes that migrate during intermittent periods of high-energy events. Internally they possess high-angle, planar, tabular cross stratification. The crests of the lobes are reworked by daily tidal and wind-induced currents leaving a record of medium-scale ripples (Ball, 1967, p. 561). The deposits of Subfacies A characteristically overlie those of Subfacies B; they possess high-angle, planar, tabular, and trough cross stratification and are dominantly oolitic and pisolitic grainstones. This subfacies suggests deposition under higher energy conditions and more constant agitation than Subfacies B.

SLOPE DEPOSITS

Figure X-9 - 6; Figure X-10 - 1, 2, 3, 4, 5, 6; Figure X-11 - 1, 2, 3, 4, 5, 6.

EVIDENCE

Deposits of Unit E consist of finely laminated and bedded silts, shales, and occasional limestones. Common to these sediments are graded beds, bioturbation features, debris flows 0.10 m - 3 m thick, channels with a cumulative thickness of 30 m, slumps 0.05 m - 1 m thick and various soft sediment deformation features including load casts, sedimentary boudinage, rotated nodules, and injection structures.

The debris flows consist of large grain-supported clasts in a matrix of finer material, commonly silt and shale. The clasts are elongate or almost square, 1 cm to 50 cm in size. The dominant lithology of the clasts is calcareous wackestones or mudstones, but there are clasts with cross-bedded silt to coarse-grained sand. Bioclastic and oolitic clasts are

Figure X-7:

1. Dolostone with lingoid ripples. Rill marks on ripple crests towards top of photograph. Unit A. Section 17. Scale interval 1 cm long.

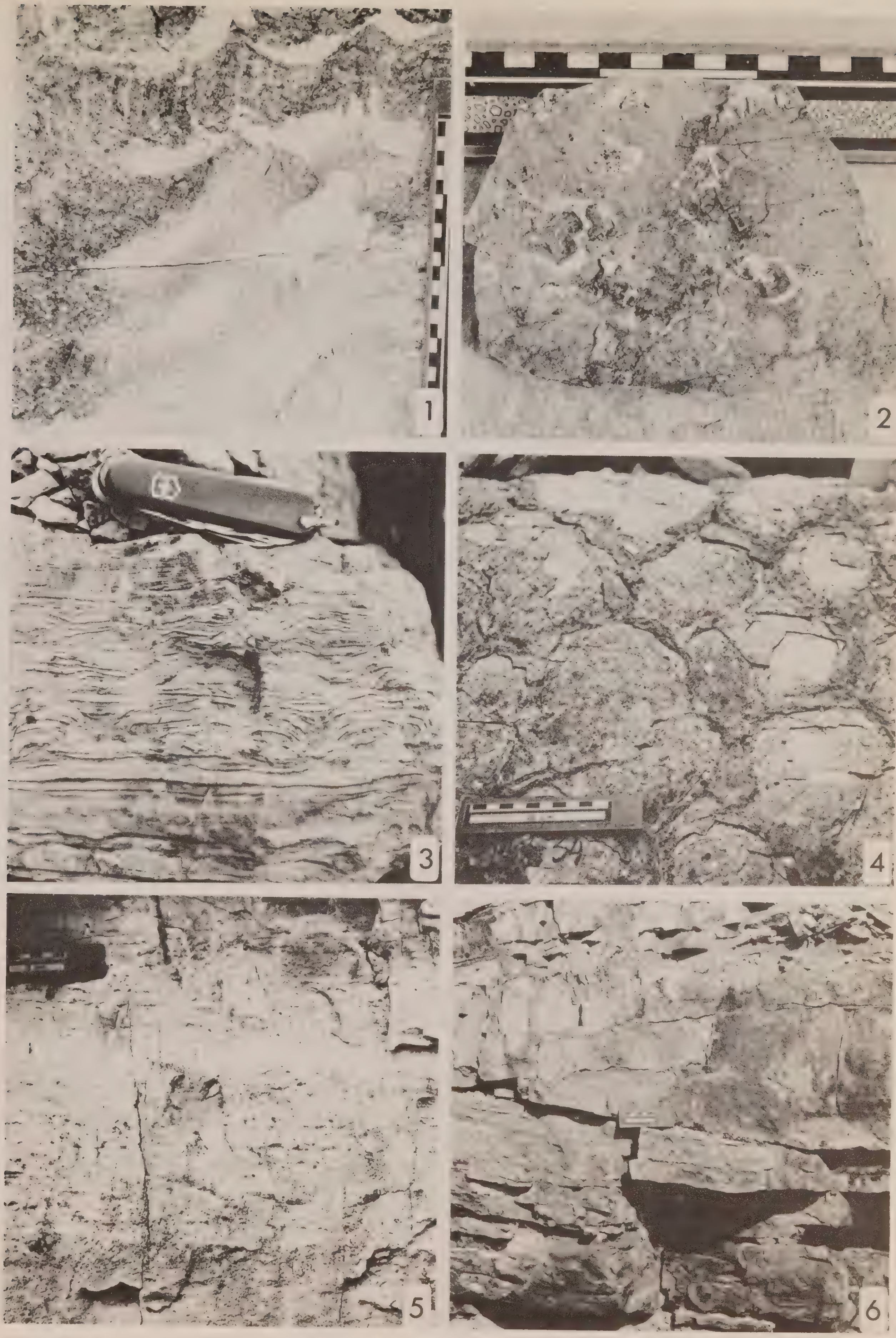
2. Salt casts in siltstone interbed. Unit A. Section 8. Scale interval 1 cm long.

3. Cryptalgal laminated dolostone with small cryptalgal domes. Unit A. Section 8. Pocket knife 9 cms long.

4. Bedding plane with weathered stromatolites. Unit A. Section 15.

5. Fenestral dolostone of Unit A. Section 5.

6. Channel in cryptalgal dolostone of Unit A. Section 5. Scale 5 cms long.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rare. The base of the debris flows is sharp and scoured, the underlying deposits in most cases are underformed or only slightly so. Gradation and incipient stratification of clasts is apparent in most flows. Imbricated clasts occur, but are rare. The flows are overlaid by calcareous grainstones and packstones with parallel laminations and ripple drift cross lamination. They are capped by shales, silts, or nodular and banded limestones.

INTERPRETATION

The structures and lithology of this unit are almost identical to those recorded on modern continental shelf edges, slopes and rises. The most diagnostic deposits of this unit are the debris flows. Very little data are available on the nature and deposits of marine sediment gravity flows except for those of turbidity currents. Debris flows are sediment mixtures of large clasts with a matrix of fine material and water, moving in response to the pull of gravity. Debris flow resembles the flow of wet concrete. Most observations of debris flows have been made on land (Bull, 1972, p. 69-71; Johnson, 1970; Sharp and Nobles, 1953). Clasts are supported within and on top of debris flows because of matrix strength (Johnson, 1970, p. 486-499) and high pore pressures. Johnson (1970, p. 495-515) suggests that debris flows consist of portions being sheared and portions that are behaving as rigid or semirigid plugs. Most shearing takes place near the base of the flow and in channeled flows along the walls (Middleton and Hampton, 1973, p. 20-26, fig. 6); as a result of the shearing, clasts can be rotated and aligned. The rigid or semirigid portion prevents much shearing and the development of a preferred clast fabric is inhibited. Johnson (1970) also suggests that if the flow is laminar, mixing appears to take place preferentially along the front or in channelled flows along the edges because of channel irregularities. It is likely that mixing is much more important in subaqueous flows than in subaerial ones as has been suggested by Hampton (1972). Fluid mixed into the flow may decrease its viscosity and increase the possibility for free clast movement thereby resulting in a preferred fabric.

Although lithologies ascribed to debris flows have been obtained by coring of deep-sea sediments, the best documented example of a recent subaqueous debris flow is by Embley (1976). In a study of the continental slope and rise of the northwest coast of Africa, near the Canary Islands, Embley has recognized a debris flow and associated slide scar covering an area of sea floor of about 30,000 km^2. The debris flow travelled over a slope as low as 0.1° and covered a distance of more than 200 km (Embley, 1976, p. 373). It is difficult to ascertain whether the debris flows of the Sekwi Formation are of comparable dimensions. Along strike, sediment gravity flows have been recognized at localities isolated from each other by 200 kms (see Fig. X-1, localities 4 and 14). They also occur over a distance of 50 kms in traverses across strike. Outcrops of separate flows have been followed along mountain slopes for distances up to 4 kms. However, individual flows were not traced between measured sections. Correlation across strike of the more massive debris flows indicates a minimum transport distance of 21 kms.

The debris flows of Unit E characteristically are overlaid by beds with plane-parallel and ripple-drift cross lamination; it is possible that these laminations may be the result of a turbidity current associated with the debris flows as suggested by Hampton (1972). The character of the clasts contained in the debris flows indicates derivation from penecontemporaneous deposits on the adjacent shelf to shelf edge.

CLASTIC DEPOSITS

EVIDENCE

In the eastern portions of the study area, rocks belonging to Unit C display large scale trough cross stratification, plane-parallel stratification, and infrequently contain silty and shaly interbeds. Individual beds in a trough set are commonly graded and in some instances are overturned. Chert pebbles are present in lag conglomerates, and load casts and slumping are common soft-sediment deformation features. Plane-parallel stratification, herringbone and low angle cross stratification as well as shale interbeds are encountered with more regularity in western sections. In the westernmost portions of the areas of study, clastic units interbedded with shale and displaying graded beds are common.

INTERPRETATION

Most of the deposits included in Unit C represent the Backbone Ranges Formation. A detailed analysis of these rocks has not been attempted. They are interpreted as a siliciclastic shelf to slope transition, developed prior to the onset of major Sekwi deposition.

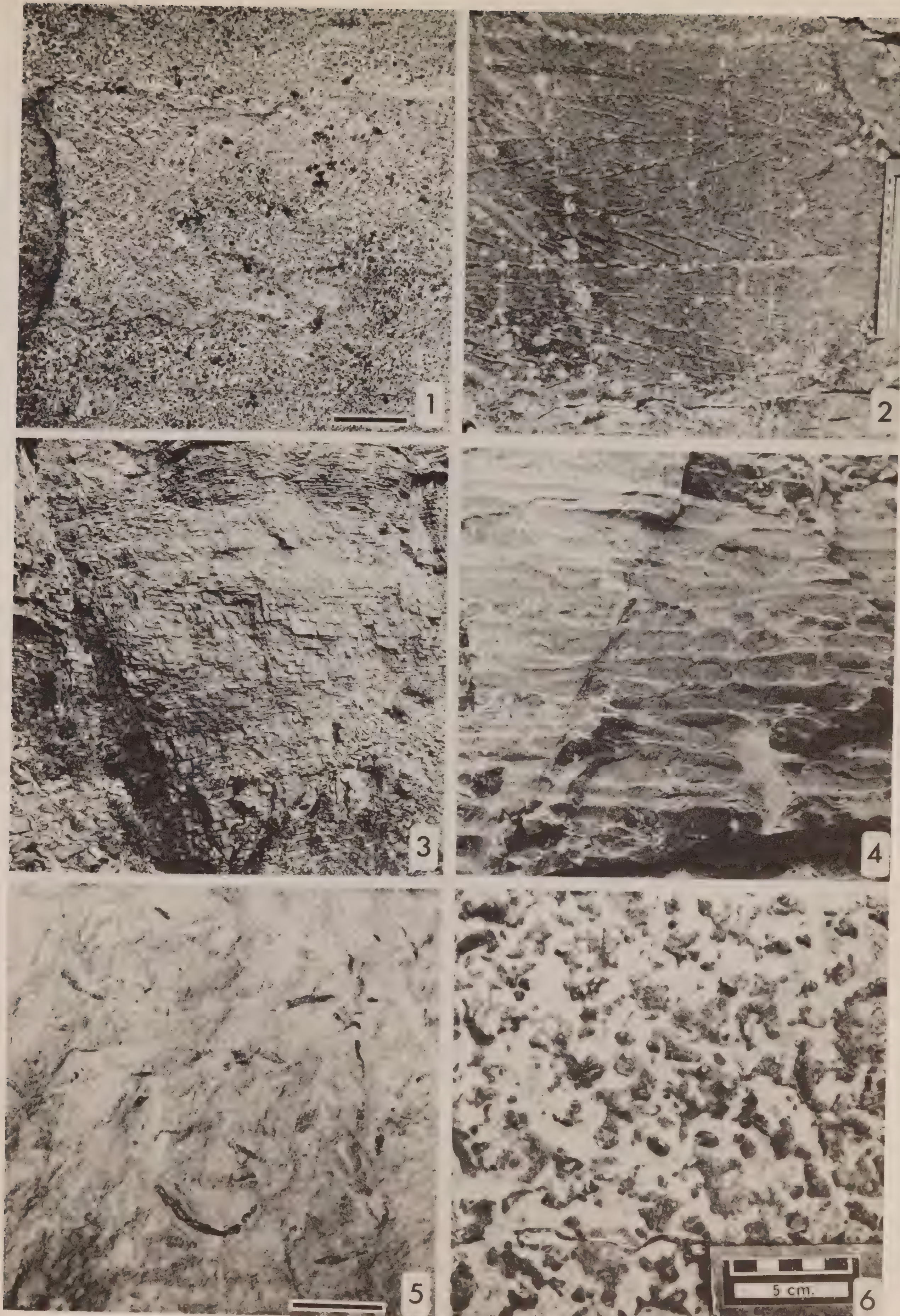
PALEOGEOGRAPHY

Interpretation of the spatial and temporal relationships of the five major sedimentary facies recognized in this report (Fig. X-3) indicates that deposition took place on an evolving trailing edge type continental margin. The sequence represents a continental shelf to slope transition, developed as part of a miogeocline-platform wedge that prograded westwards from the North American craton into an ocean basin. Basinal facies were probably continuous into what is now the core zone (Omineca Crystalline Belt) of the Columbian Orogen.

A reconstruction of the facies distribution and the nature of the shelf to slope transition within

Figure X-8:

1. Oolitic and pisolitic dolomitized grainstone. Section 9. Scale 2 cms long.
2. Oolitic dolostone displaying bidirectional cross bedding. Unit D. Subfacies B. Section 8. Scale 25 cms long.
3. Oolitic limestone with plane parallel stratification. Unit D. Subfacies A. Section 9. Person on left foreground provides scale.
4. Irregularly banded limestones of Unit B. Calcareous mudstones in grey bands and calcareous shales in light grey bands. Bands average 4 cms in thickness. Section 16.
5. Bedding plane with molds of burrows in banded limestone of Unit B. Section 15. Scale 2cms long.
6. Bioturbated limestone of Unit B displaying anastomosing pattern of nodules in bedding plane. Section 17.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the Sekwi Formation is shown for late *Nevadella* and *Bonnia-Olenellus* times in Figure X-12. The positions of the measured sections used in the reconstruction are indicated on each diagram. The general pattern of deposition represented by the coastal plain to continental shelf to continental rise vironments fluctuated locally during subsidence giving rise to marked cyclic alternation of lithologies to the east (Fig. X-2, Section 9). During early *Bonnia-Olenellus* time the shelf edge was defined by a complex of oolite shoals and supratidal deposits and not an organic reef as suggested in previous interpretations. Later *Bonnia-Olenellus* times were characterized by progressive progradation of intertidal and shallow subtidal facies westward over the slope facies.

DOLOMITIZATION AND MINERALIZATION

The close association of dolomite and lead-zinc mineralization in stratabound ore deposits has been frequently noted. In the Sekwi Formation three types of dolomite can be recognized:

(1) very fine grained dolomite, commonly yellow or grey, associated with mudcracked cryptalgal fabrics;
(2) coarse sand-sized dolomite that overprints and obscures most depositional structure associated with orange or dary grey, bioturbated oolitic and oncolitic facies;
(3) coarsely crystalline white sparry dolomite found ubiquitously in vugs, veins, and fractures.

Rocks of the Sekwi Formation closer to the Mackenzie Arch are more dolomitized than similar rocks to the west. Also, dolomitization is more prevalent in rocks of the *Bonnia-Olenellus* zone than in the underlying deposits. This pattern may reflect a diagenetic overprinting related to the development of the sub-Upper Cambrian Unconformity. This suggestion, however, ignores other field evidence. For example, the very fine grained dolomite is closely linked with the tidal flat facies of Unit A. This fact plus the associated sedimentary textures (see tidal flat description, this report) suggests to us that the dolostones developed by mechanisms not unlike those recorded for present day supratidal flats of the Bahamas, Florida, the Persian Gulf, and western Australia. Dolomitization along a shoreline feature would also satisfactorily explain the preferential dolostone development observed to the east. It is perhaps more difficult to explain satisfactorily the origin of the second and third types of dolomite encountered in the Sekwi Formation. It is probable that the dolomitizing solutions were not basinally derived as the equivalent carbonates of the slope deposits are characteristically undolomitized. The assumption made here is that some degree of dolomitization of slope and basin carbonates would be evident if the dolomitizing fluids migrated updip. Furthermore, dolomitization appears to be unrelated to the Upper Cambrian erosional epidode because of the occurrence of undolomitized Middle Cambrian limestones overlying the Sekwi Formation. The third type of dolomite is undisputably of late origin; it is a vein and fracture filling type and has crosscutting relationships with the surrounding rocks. The second type of dolomite is also associated with fractures. This observation is corroborated by evidence collected at Caribou Pass and observed elsewhere in reconnaissance traverses of the study area. At Caribou Pass several beds on one side of a normal fault, cutting through rocks of Unit E, are dolomitized along a front 600 m in length; on the other side of the fault equivalent beds are completely undolomitized. It is suggested here that dolostone types 2 and 3 are closely linked and occurred relatively late in the post depositional history of the Sekwi Formation. Both types are unrelated to the sedimentary faces and are probably a product of tectonic processes and burial diagenesis.

Lead, zinc, and pyrite mineralization is evident at Section 15 and Section 16. At 'Hawkeye Creek' (Section 16) galena, sphalerite, and white coarsely crystalline dolomite occur as void-filling minerals in a fault breccia within cryptalgal sediments of Unit A. The sphalerite is coarse grained and commonly white, light yellow, or light green in color. Near the middle of Section 16, medium to fine grained dark brown sphalerite is found in association with pyrite, white dolomite, and quartz in a grey fenestral dolostone host rock. The sphalerite and pyrite commonly form elongate, interconnected pods and appear to be lining and infilling voids and channels. Minor sphalerite mineralization also occurs along stylolitic seams in the same interval. A cryptalgal dolostone band 3 m to 6 m (10 ft. to 20 ft.) thick containing abundant pyrite mineralization is evident near the top of Section 15. Pyrite lining a series of interconnected voids occurs in association with later infilling, white, coarsely crystalline dolomite. The exposure is quite conspicuous due to the characteristic red and orange-brown weathering stain of the pyrite.

It is apparent that base metal mineralization is not extensive in the 22 sections examined. Furthermore, where lead and zinc mineralization is developed, as at sections 15 and 16, it cannot be traced laterally for more than a few tens of metres. The most obvious association is with late stage sparry dolomite in vugs and fractures; there is no specific relationship to depositional facies or to stratigraphic position within the Sekwi Formation.

Figure X-9:

1. Banded, bioturbated limestone of Unit B. Section 20. Intervals on scale 1 cm long.

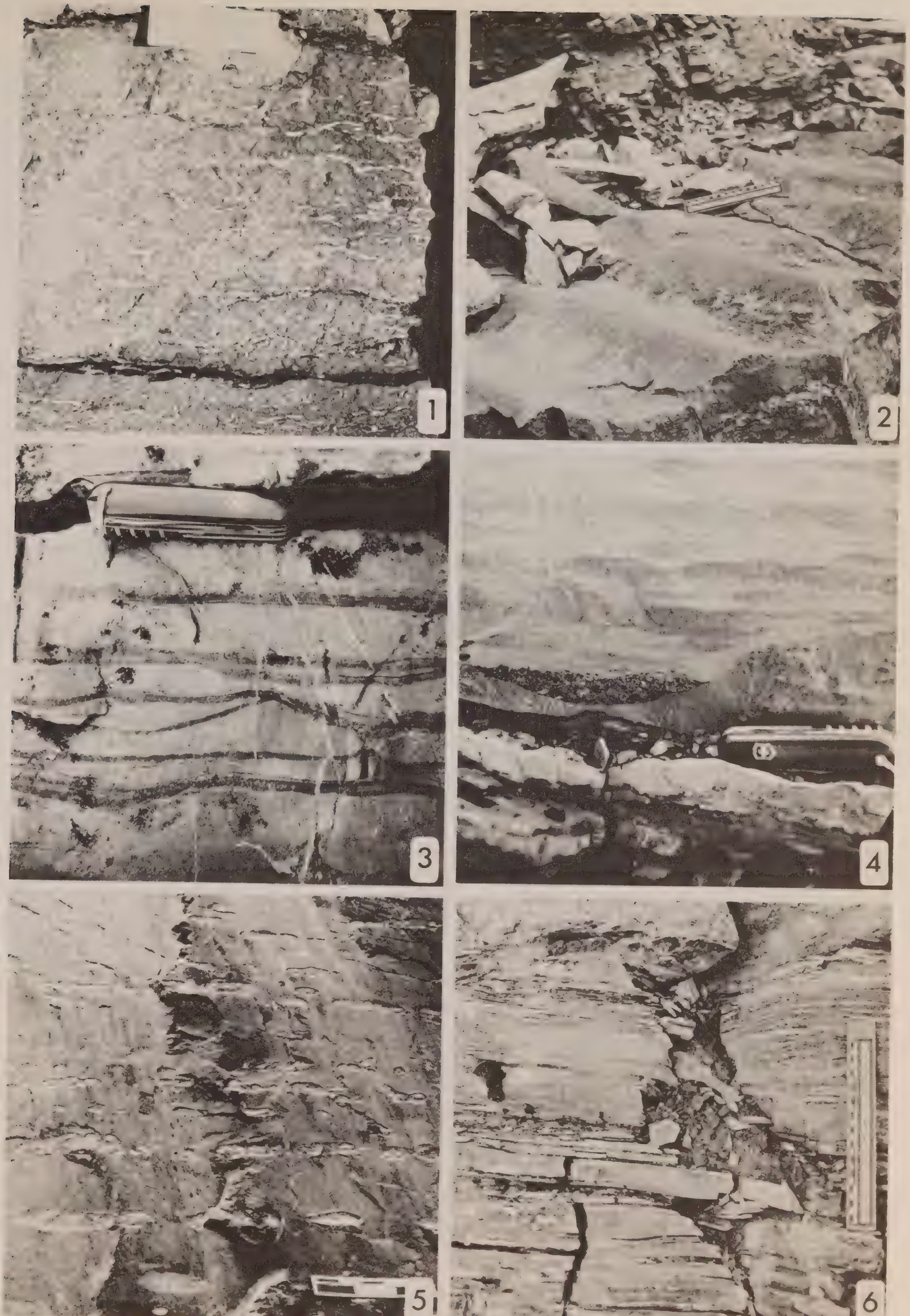
2. Oolitic limestone with large oscillation ripples interbedded with banded limestone beds of Unit B. Section 16. Scale 25 cms long.

3. Banded dolostone. Dark grey bands are shaly. Section 8. Pocket knife 9 cms long.

4. Unit B limestone displaying scour, small debris flow and channel fill. Section 8. Pocket knife 9 cms long.

5. Aligned limestone nodules surrounded by calcareous shale matrix. Unit B. Section 8. Scale 25 cms long.

6. Plane parallel laminations in limestone of Unit E. Section 8.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CONCLUDING REMARKS

(1) The sedimentary sequence observed in the Sekwi Formation is representative of a coastal plain to continental shelf to continental rise transition. Five sedimentary assemblages are used to define this transition; supratidal/tidal flat, intertidal-shallow subtidal, oolitic, slope and clastic. The subaerial and shallow-shelf assemblages are distinctly cyclic.

(2) The sedimentary succession observed in the area of study suggests that the Sekwi Formation was deposited on a trailing edge type continental margin.

(3) The shelf edge during Mid- and Late-Sekwi times was defined by an oolite shoal complex rather than an organic reef as proposed in previous interpretations.

(4) The Sekwi Formation and the Backbone Ranges Formation interdigitate and are therefore correlative.

(5) A major transgressive event is recorded in the rocks of the Sekwi Formation for *Fallotaspis* through Mid-*Nevadella* times. A marked shallowing of the basin is evident by late *Nevadella* time. A carbonate shelf was well established in the area of study by *Bonnia-Olenellus* times. At least six transgressive and regressive events are recorded in the sequence for this time interval.

(6) Two stages of dolomitization overprint the rocks, one almost syn-sedimentary, the other probably related to tectonism. Dolomitization appears to be unrelated to basinal fluid migration or to the Sub-Upper Cambrian unconformity.

(7) Mineralization in the Sekwi Formation is independent of the sedimentary facies but is related to late stage dolomitization. Where observed, lead-zinc mineralization is closely associated with fractures.

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Figure X-10:

1. Shaly siltstone of Unit E with parallel laminations and interbedded slump. Section 8. Scale 25 cms long.

2. Overturned slump in calcareous silts of Unit E. Section 8.

3. Outcrops of the Sekwi Formation at Section 9 near the Ingta River. Cliffs of oolitic dolostone (Unit D) cap the mountain. Debris flow beds are located on the lowermost slopes (Unit E).

4. Note the scoured base and irregular top of the debris flow in middle ground. Unit E. Section 7.

5. Debris flow bed at Section 9 with sharp base, rubble zone (grey) and turbidite zone (light grey). Unit E. Flow 3 m thick.

6. Scoured base of large debris flow at Section 7. Unit E. Scale in middleground 25 cms long.

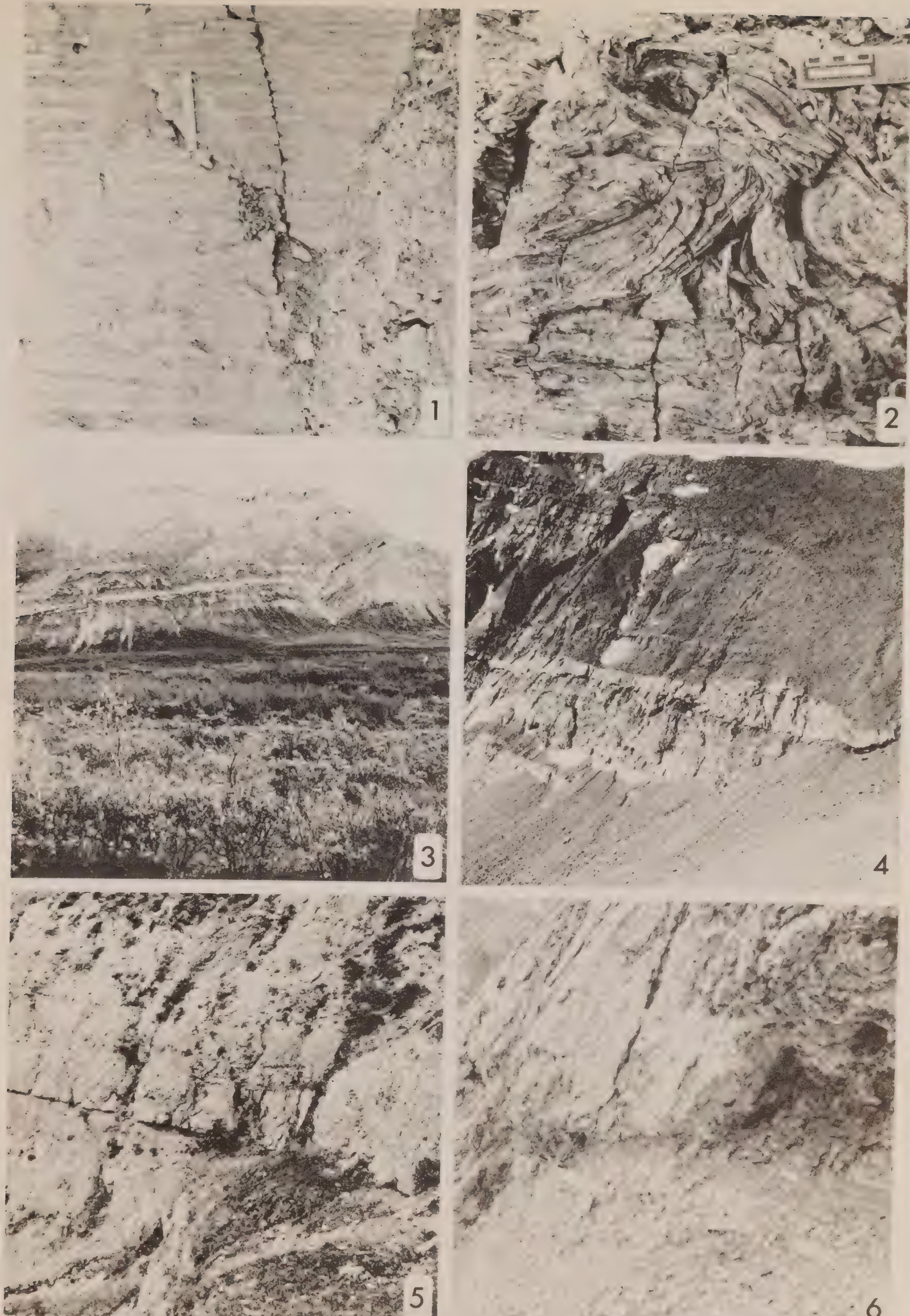
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Table X-1

LOCATION OF REFERENCE SECTION

SECTION	LATITUDE	LONGITUDE	INFORMAL NAME
1	63°10'N	128°27'W	Blizzard Creek
2	63°15'N	128°34'W	
3	63°16'N	128°50'W	
4	63°35'N	128°10'W	
5	63°34'N	128°31'W	Keele River
6	63°32'N	128°36'W	June Lake
7	63°31'N	129°00'W	Dahl Sheep
8	63°33'N	129°12'W	Caribou Pass
9	63°26'N	129°22'W	Ingta River
10	63°47'N	130°28'W	
11	63°52'N	129°25'W	
12	64°10'N	129°15'W	Hay Creek
13	64°16'N	129°29'W	Thunderhead Cirque
14	63°24'N	129°27'W	
15	64°23'N	129°43'W	Mountain River
16	64°25'N	129°49'W	Hawkeye Creek
17	64°31'N	129°57'W	Foggy Creek
18	64°44'N	130°46'W	Goober Lake
19	64°26'N	131°22'W	
20	64°37'N	131°43'W	Arctic Red
21	64°49'N	131°58'W	
Tic Core-22			
Sheepheard-23	63°47'N	128°23'W	
Mount Cap-24	64°57'N	127°16'W	

Figure X-11:

1. Grain-supported clasts in debris flow at Section 9. Unit E. Scale 25 cms long.

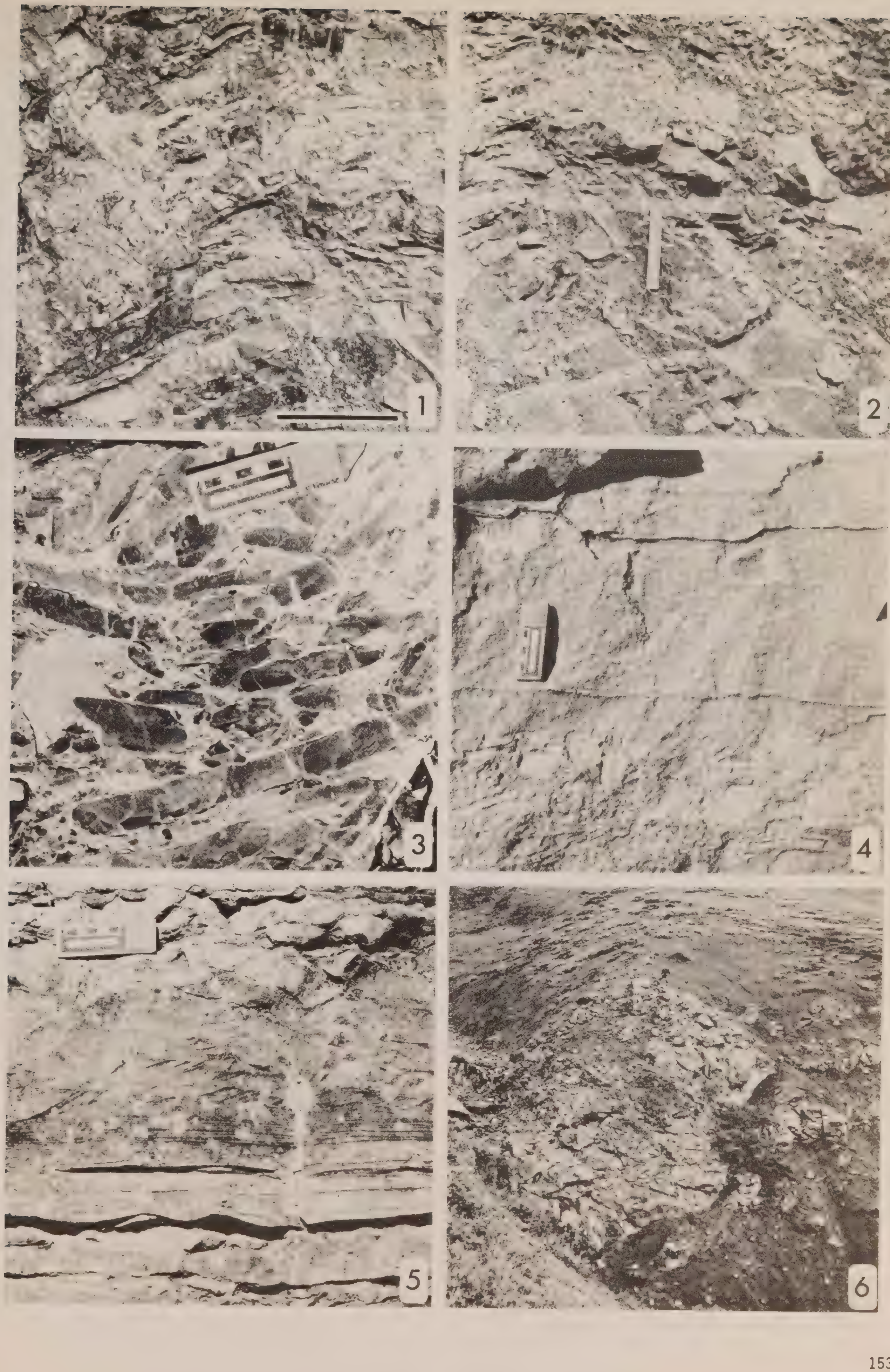
2. Sheared beds underlying debris flow at Section 9. Unit E. Scale 25 cms long.

3. Aligned and grain-supported clasts. Calcareous shale matrix. Unit E. Section 8.

4. Transition zone from aligned rudstone into overlying parallel laminated packstone. Unit E. Section 8. Scale 5 cms long.

5. Turbidite zone of debris flow with parallel laminated base and overlying ripple drift cross laminations. Unit E. Section 8.

6. Debris flow channel with archeocyathid-*Renalcis* biohermal cap. Person standing on top of mound. Unit E. Section 9.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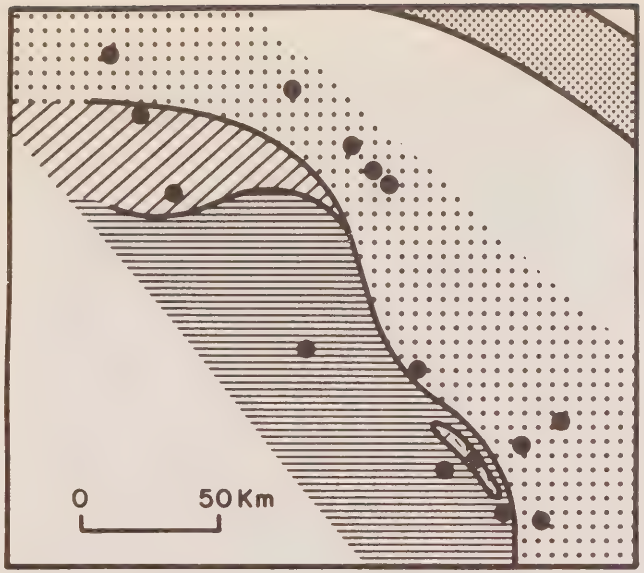
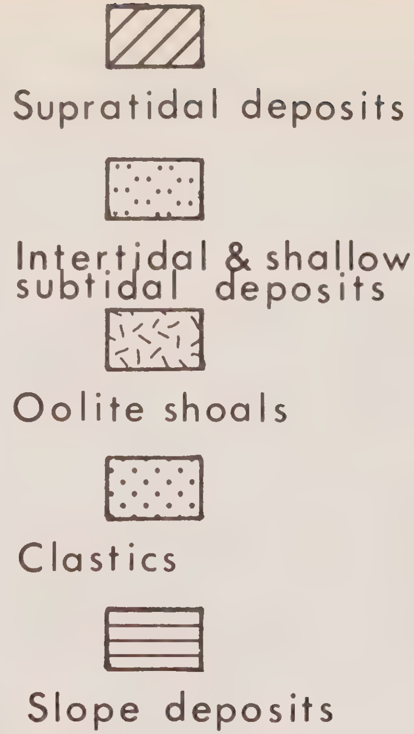
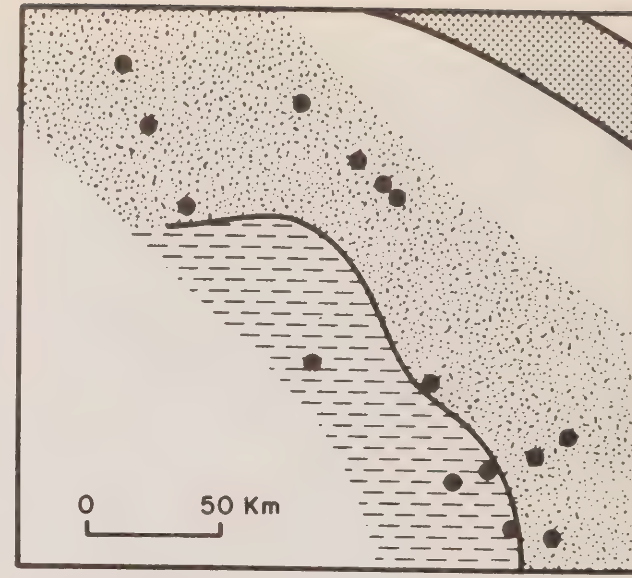


LATE NEVADELLA
FACIES DISTRIBUTION





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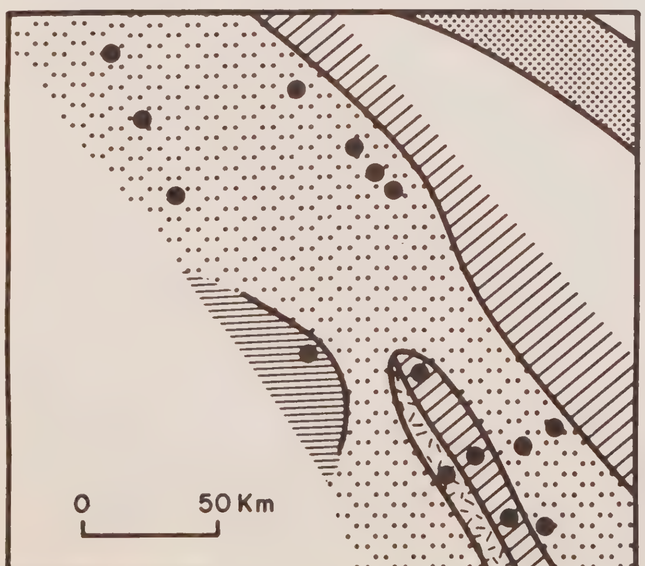

EARLY BONNIA-OLENELLUS
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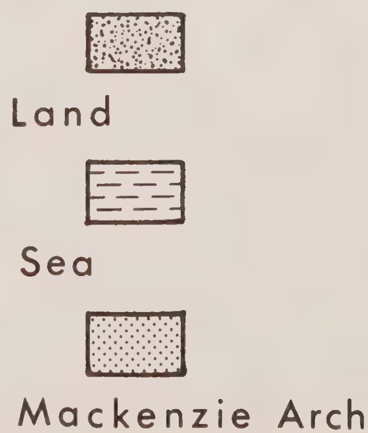

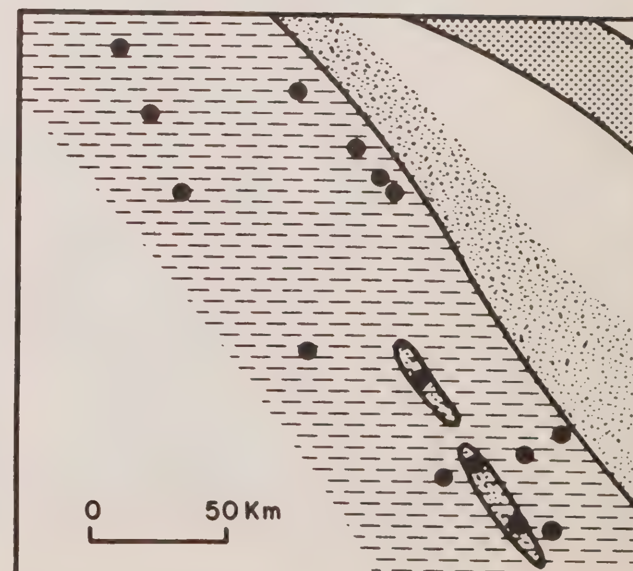

EARLY BONNIA-OLENELLUS
PALEOGEOGRAPHY

Figure X-12: Reconstruction of the facies distribution and the nature of the shelf to slope transition within the Sekwi Formation for late *Nevadella* and *Bonnia-Olenellus* times.

Late Nevadella Time: Clastic and carbonate tidal flat deposits in the east, north, and northwest grade into marine beach, foreshore and slope-rise sediments to the west. A small oolite shoal is shown in the southeastern portion of the area.

Early Bonnia-Olenellus Time: Shallow marine deposits cover a larger portion of the area reflecting a general rise in sea level. The sediments are predominantly calcareous. The tidal flats of late *Nevadella* time have shifted eastwards and a large oolitic shoal complex with associated tidal flats in its lee has developed in the southeast. Slope deposits are restricted to the western areas.

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STRATIGRAPHY AND SEDIMENTOLOGY, UPPER PROTEROZOIC REDSTONE COPPER BELT, MACKENZIE MOUNTAINS, N.W.T. - A PRELIMINARY REPORT

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ABSTRACT

Key stratigraphic units of the Redstone copper belt are the stromatolitic upper carbonate subunit of the Little Dal Group; evaporites, red mudstones, sandstones and conglomerates of the Redstone River Formation; and limestone turbidites of the Coppercap Formation. These are overlain, generally with angular unconformity, by rhythmites and glaciogenic rocks of the Rapitan Group. Little Dal to Coppercap strata record a progression from shallow marine, platformal carbonate sedimentation, through restricted marine or lacustrine evaporite and subaerial clastic deposition, to clastic carbonate resedimentation below wave base. Tectonic instability and an embayed northwest-trending coast influenced sedimentation, especially during Redstone River time.

Stratiform occurrences of disseminated copper sulphides are located in the transition zone between the Redstone River and Coppercap Formations, and range greatly in thickness, lateral extent and grade. At Coates Lake, disseminated copper sulphides occur in up to seven, green and buff, impure limestone beds. The cupriferous beds are intercalated with barren red beds and range up to 3 m in thickness and several km^2 in areal extent. In other parts of the copper belt, disseminated copper sulphides occur in one or two, thin, stratiform beds or in discontinuous, thin to thick pods near apparent fault zones.

Syngenetic to early diagenetic primary mineralization is suggested by zoning (decreasing copper:iron toward top and sides) and stratiform shape of occurrences, and by association of the disseminated sulphides with sedimentary or early diagenetic porosity (intra-grain pores, sedimentary fractures and fenestrae) and replacement (evaporite cast) features. Sabkha conditions during deposition of the copper-bearing beds are suggested by evaporites, red beds, cryptalgal laminated carbonate rocks, ripple marks and desiccation cracks. Shape, size and grade variations of occurrences were possibly influenced at the time of sedimentation and diagenesis by local growth faults and details of coast morphology.

INTRODUCTION

Disseminated chalcocite, bornite, chalcopyrite and digenite occur as stratiform deposits at or near the contact between the Redstone River and Coppercap Formations in discontinuous outcrop that extends for at least 350 km along the Plateau Thrust Fault zone at the western margin of the Mackenzie Mountains, N.W.T. (Fig. XI-1). The Mackenzie Mountains are an arcuate belt of Upper Proterozoic to Upper Paleozoic, epicontinental clastic and carbonate strata with rare volcanic rocks. Metamorphism is sub-greenschist grade, and primary sedimentary structures and textures are well preserved. The obvious tectonic structures open folds and thrust faults of broadly Laramide age, have no apparent relationship to the copper occurrences discussed here. Movement along the Plateau Thrust zone and strike-slip faults is thought by the writer and other workers in the area (Cook and Aitken, 1974; pers. comm. 1977) to be in the order of 10 miles or less, with little rotation involved. Hence facies and paleocurrent data appear to be generally representative of original depositional configurations, although not exact positions.

The copper deposit at Coates Lake (Fig. XI-1) was discovered by the Nahanni Sixty Syndicate in 1962. J. Coates (1964) studied the deposit in detail for Redstone Mines Ltd. In 1975 Shell Canada optioned the property and staked much of the belt to the north, especially in the Keele River area. Other companies with major interests in the area include Rio Tinto, Canadian Nickel Company and Cordilleran Engineering. The stratigraphy and tectonic framework of the general area have been discussed by the following: Gabrielse *et al.*, (1973), Aitken *et al.*, (1973, 1978), Aitken and Cook (1974), Aitken (1977a, b), Eisbacher (1976, 1977, 1978), Young *et al.*, *(in press)* and Yeo *(in press)*.

The purposes of this study are to discuss the stratigraphy and sedimentology of the copper belt on a regional scale and, within this context, to compare the mineralization of the Coates Lake area with that of the rest of the belt. This is a preliminary report based mainly on field data.

REGIONAL STRATIGRAPHY AND PALEOGEOGRAPHY

Table XI-1 summarizes Proterozoic stratigraphy in the region of the Redstone copper belt. The key stratigraphic units are the upper carbonate subunit of the Little Dal Group; the Redstone River and Coppercap Formations. These compose the uppermost part of the Mackenzie Mountains Supergroup described by Young *et al.*, *(in press)* and are overlain by the Rapitan Group. The Mackenzie Mountains Supergroup comprises the older Proterozoic, epicontinental strata in the Mackenzie Mountains, listed in Table XI-1. These strata have been correlated in detail with rocks of the Amundsen Basin to the northeast (Young, 1977; Young *et al.*, *in press*; Aitken *et al.*, 1978b) although some aspects of the correlation have yet to be resolved to the satisfaction of all parties. The Amundsen Basin includes the Shaler Group of the Brock Inlier (inset, Fig. XI-1), Banks and Victoria Islands, and the Rae Group of the Coppermine area. Amundsen Basin strata have been bracketted in age between about 1200 and 750 m.y. (Young, 1977). Correlation has also been suggested between strata of the Mackenzie Mountains Supergroup and Helikian Belt-Purcell strata in British Columbia and northwestern United States (Gabrielse *et al.*, 1973) although details have yet to be proposed.

The outcrop pattern of the studied stratigraphic units is shown in Figure XI-1. Redstone River and Coppercap areas are absent in areas indicated by hachures (marginal), and thicken markedly toward centres of the intervening areas (basinal). Paleocurrent directions indicate transport during Redstone River time generally toward the southwest and specifically

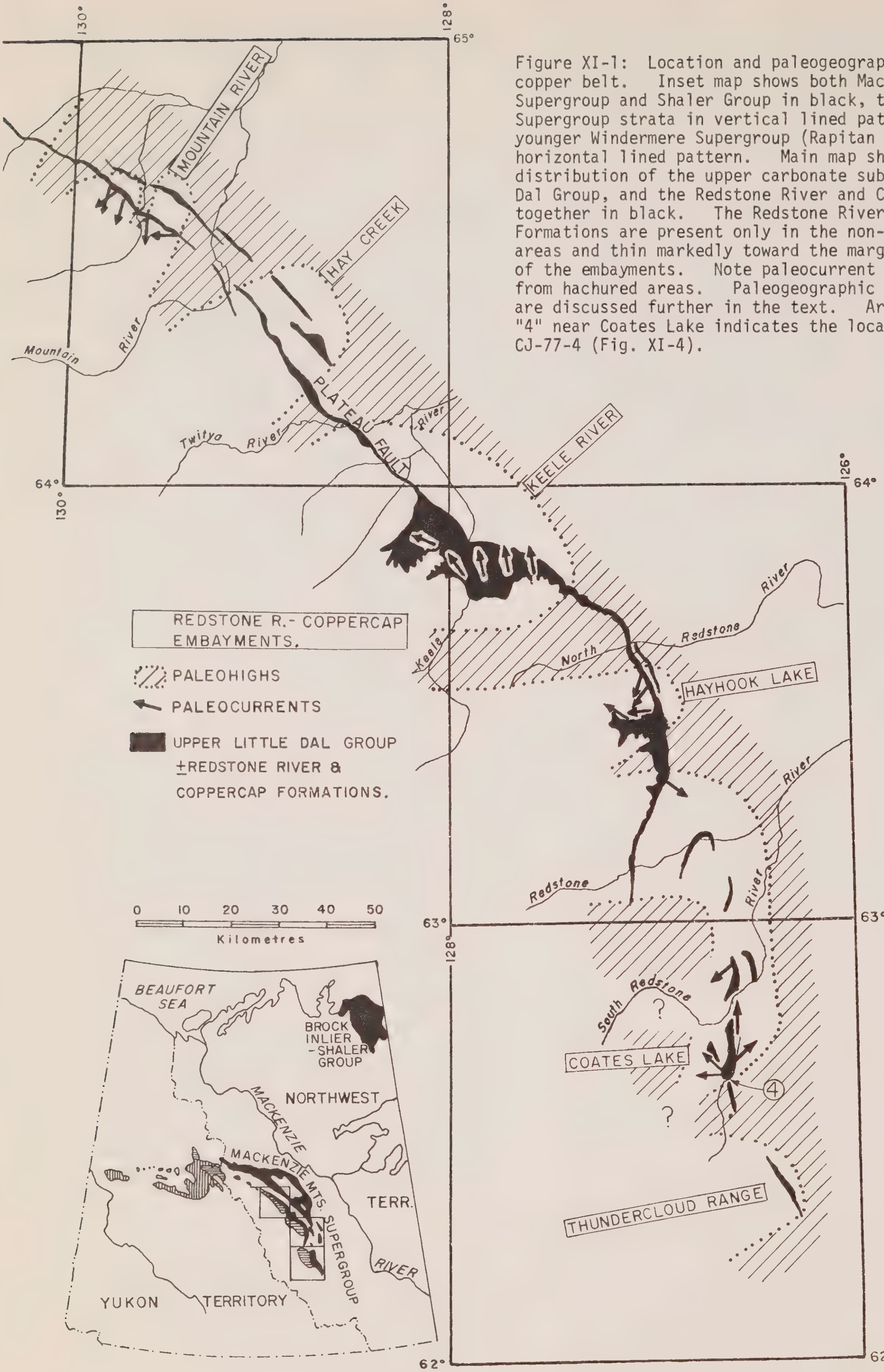

Figure XI-1: Location and paleogeography of the Redstone copper belt. Inset map shows both Mackenzie Mountains Supergroup and Shaler Group in black, the older Wernecke Supergroup strata in vertical lined pattern, and the younger Windermere Supergroup (Rapitan Group) strata in horizontal lined pattern. Main map shows the outcrop distribution of the upper carbonate subunit of the Little Dal Group, and the Redstone River and Coppercap Formations together in black. The Redstone River and Coppercap Formations are present only in the non-hachured embayment areas and thin markedly toward the margins (dotted line) of the embayments. Note paleocurrent directions away from hachured areas. Paleogeographic interpretations are discussed further in the text. Arrow from circled "4" near Coates Lake indicates the location of section CJ-77-4 (Fig. XI-4).

TABLE XI-1

PROTEROZOIC ROCKS IN THE REDSTONE COPPER BELT

ERA	EPOCH		GROUP, FORMATION AND APPROXIMATE THICKNESS (metres)	LITHOLOGY
Proterozoic	Hadrynian		Sheepbed Formation 830+	Shale, siltstone, argillaceous dolostone
		Hay Creek Gp.[2]; Rapitan Group[3]	Keele Formation 670	Dolostone, sandstone, shale
		Hay Creek Gp.[2]; Rapitan Group[1]; Rapitan Group[3]	Twitya Formation 1170	Shale and minor sandstone
			? unconformity	
		Rapitan Group[2]; Rapitan Group[1]; Rapitan Group[3]	Shezal Formation 775	Grey diamictite, minor orthoconglomerate and sandstone
			local ? unconformity	
		Rapitan Group[2]; Rapitan Group[1]; Rapitan Group[3]	Sayunei Formation 750	Maroon diamictite, mudstone rhythmites, iron-formation, ? volcanics
			regional angular unconformity; local ? conformity	
	Helikian / Hadrynian	Mackenzie Mountains Supergroup	Coppercap Formation 300	Limestone turbidites, fetid shaly limestone, algal limestone, dolostone
		Mackenzie Mountains Supergroup	Redstone River Formation 0-1,000	Gypsum, anhydrite, red mudstone, sandstone, conglomerate
		Mackenzie Mountains Supergroup; Little Dal Group	upper carbonate subunit 900	Stromatolitic, molar-tooth-bearing, oolitic carbonates; minor volcanics, evaporites, sandstone, shale
		Mackenzie Mountains Supergroup; Little Dal Group	rusty shale subunit 230	Shale, minor sandstone and stromatolitic dolostone
		Mackenzie Mountains Supergroup; Little Dal Group	gypsum subunit 530	Gypsum, anhydrite, minor red mudstone
		Mackenzie Mountains Supergroup; Little Dal Group	grainstone subunit 270	Stromatolitic, molar-tooth-bearing oolitic grainstone; shaly carbonates
		Mackenzie Mountains Supergroup; Little Dal Group	basinal sequence 400	Huge stromatolite bioherms; shaly carbonate rhythmites; grainstones
		Mackenzie Mountains Supergroup; Little Dal Group	mudcracked subunit 60	Shale, sandstone
		Mackenzie Mountains Supergroup	Katherine Group 2,000	Quartzose sandstone, shale, stromatolitic orange dolostone
		Mackenzie Mountains Supergroup	Tsezotene Formation 1,500	Shale, siltstone, sandstone, stromatolitic limestone, dolostone
		Mackenzie Mountains Supergroup	Map-Unit H1 400+	Cherty stromatolitic dolostone
			base not exposed	

Table XI-1: Table of Proterozoic rock units in the Redstone copper belt area, after Gabrielse *et al.*, (1973)[1], Aitken *et al.*, (1973), Aitken (1977), Aitken *et al.*, (1978a), Young *et al.*, *(in press)*, Eisbacher (1978)[3] and Yeo *(in press)*[2].

toward basinal areas. These factors suggest an embayed configuration of the overall northwest-trending paleo-coastal zone during uppermost Little Dal to Coppercap time. The embayments appear to have a random orientation; however, this may be due to incomplete data. Exact details of individual embayment configuration would require much small-scale mapping and drill-core analysis of these poorly exposed strata.

Faulting along north-south axes as postulated by Eisbacher (1977) could have influenced development of the embayments. These faults range in age from pre-Redstone River to post-Sayunei Formations. The older faults are suggested by basic dykes possibly coeal with Little Dal volcanic rocks (Eisbacher, 1977, 1978) whereas younger faults are identified where they offset younger strata, such as the Coppercap-Sayunei contact in the Keele River area. Many faults cutting the lower Little Dal are of uncertain age because they are truncated by the sub-Rapitan unconformity with no intervening younger strata. Northwesterly to east-west faults were also active during Redstone River time. For example, paleocurrent directions away from, and proximality of Redstone River conglomerates to, the Plateau Thrust Fault suggest that during Redstone River time the Plateau Fault zone may have been one of normal faulting, downthrown to the west.

Figure XI-2 is a composite sketch showing stratigraphy and facies changes of a generalized stratigraphic wedge of uppermost Little Dal to Rapitan strata. Faults are not shown because their relationship to the stratigraphy could not be properly defined in outcrop and a diagrammatic representation might be misleading. For example, possible contemporaneous faults shown by Eisbacher (1977, Fig.46-8) for the Mountain River area are not present in that area, where lenticular stratigraphy is the rule. Figure XI-3 is a photograph of a Mountain River section showing the lenticular stratigraphy of the Little Dal to Rapitan strata.

Upper Carbonate Subunit of the Little Dal Group

The lower part of the upper carbonate subunit consists mainly of laterally extensive platformal limestones and dolostones with columnar stromatolites, molar-tooth structure (Smith, 1968) and oolitic grainstones. The upper part of the subunit has lateral facies changes, with lenticular members of pillowed and flow basalts, stromatolitic carbonates, evaporite-rich carbonates, sandstones and shales. Tops of basalt members are weathered, with jasper-filled fractures, and reworked into volcanic conglomerates and sandstones. These represent the only major Proterozoic igneous event in the Mackenzie Mountains, providing they are co-magmatic with basic dykes and sills cutting underlying units as suggested by Eisbacher (1978). Other minor igneous events are represented by one mafic dyke cutting the Redstone River, Coppercap and Sayunei Formations in the Coates Lake area (Coates, 1964), diatremes cutting the same strata in the Coates Lake and Keele River areas, and possible tuffaceous beds and volcanic conglomerates within the Sayunei and Shezal Formations (Coates, 1964; Upitis, 1966; and Gross, 1965).

In marginal parts of some embayments, near the dotted line in Figure XI-1, the uppermost part of the Little Dal comprises intercalated buff dolostones and brick red mudstones. The dolostones have shrinkage cracks, teepee structures (Assereto and Kendall, 1977), flat-chip breccias and beach rock (*ibid.;* Donaldson and Ricketts, 1977). The environment is interpreted as a low-energy marine shoreline where intertidal to supratidal carbonates were repeatedly developed upon, then covered by, red, distal alluvial muds.

In basinward sections, the upper part of the Little Dal is characterized by dull grey-weathering, finely laminated carbonate rock with domal stromatolites, and terrigenous clastic members.

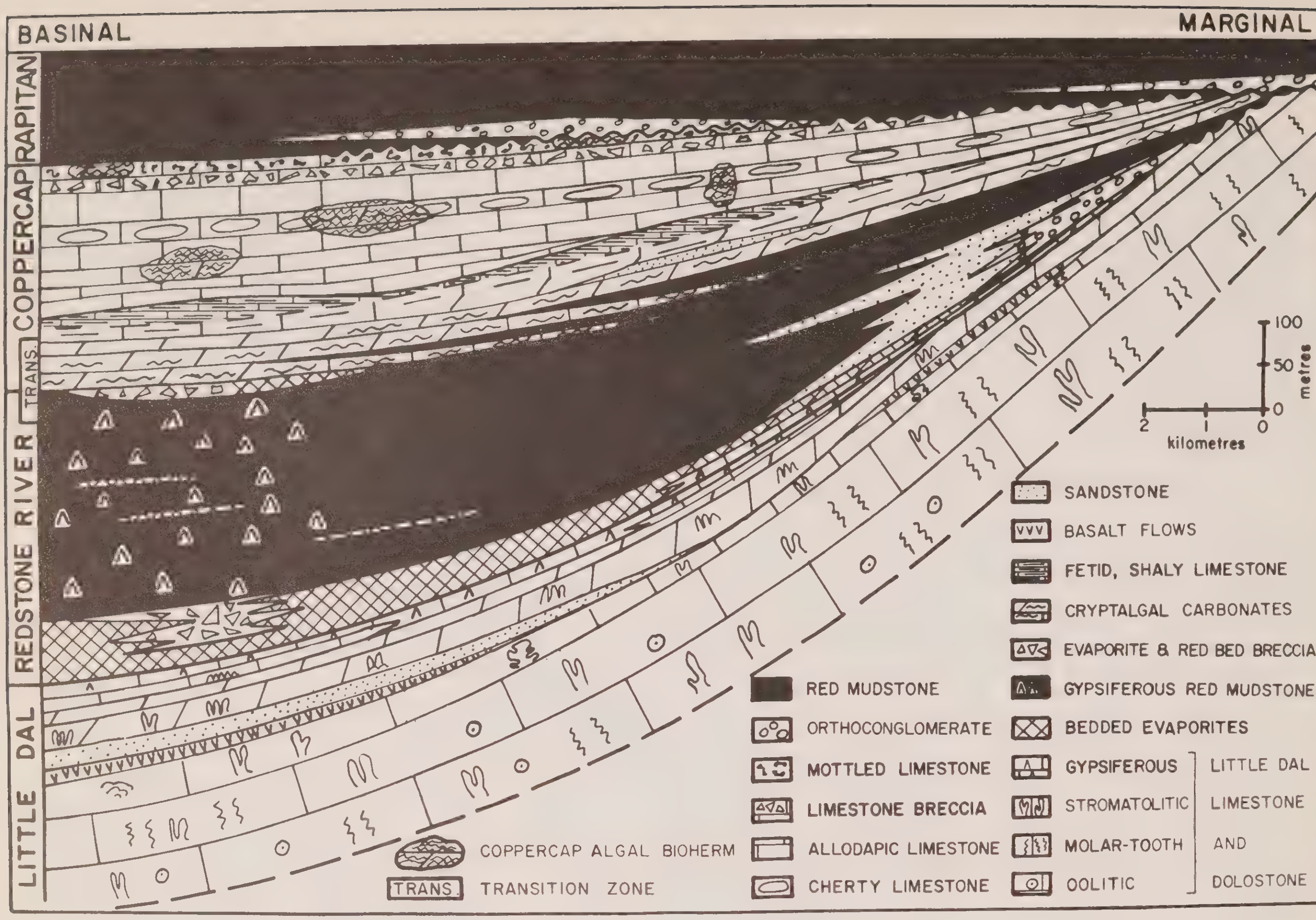

Figure XI-2: Composite sketch showing generalized stratigraphy and facies changes in the upper carbonate subunit of the Little Dal Group (LITTLE DAL), and the Redstone River, Coppercap and lower Sayunei (RAPITAN) Formations. Note vertical exaggeration of scale. Some minor unit thicknesses have been further exaggerated for diagrammatic purposes (e.g. orthoconglomerates in the Sayunei Formation and individual limestone beds in the transition zone).

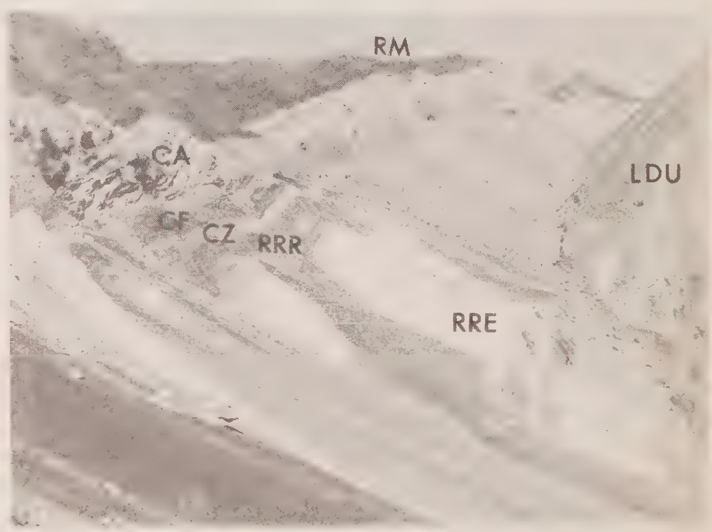

Figure XI-3: Photograph of a section in the Mountain River area, looking north, showing from east to west the succession: uppermost Little Dal (LDU), evaporites (RRE) and red beds (RRR) of the Redstone River Formation, the transition zone mainly basal Coppercap CZ), fetid shaly limestone of the middle subunit of the Coppercap (CF), allodapic and laminated limestones of the upper subunit of the Coppercap (CA), and the basal Sayunei Formation of the Rapitan Group (RM). For scale, the white evaporite unit in the middle ground is about 100 m thick.

comprising black, green and pale grey shales, and rusty, white- and yellow-stained quartzose sandstone. The clastic rocks are planar laminated with rare small-scale cross beds. Pyrite and minor chalcopyrite are disseminated in the sandstones and shales. Dolostones overlying the clastic rocks are pale grey, recessive, and pyritic or gypsiferous.

These facies changes suggest that embayment development commenced during upper Little Dal time, if not earlier. The following sections will give evidence that embayments continued to influence sedimentation during Redstone River and Coppercap time, and perhaps later.

Redstone River Formation

In basinal sections, the lower boundary of the Redstone River Formation is gradational, and is here defined at the base of up to 200 m of bedded evaporites. The gypsum, anhydrite and their mudstone components are white to pale grey and locally brilliant red in colour. The evaporites thin toward embayment margins where they grade laterally into beds that are more calcareous and richer in red muds.

In marginal sections, where the evaporites are very thin or absent, the base of the formation is defined as the base of a sequence of continuous clastic rocks overlying Little Dal carbonate rocks. Here the basal contact is abrupt and sedimentary, or intercalated. Unconformity toward paleohigh areas is indicated by the dominance of clasts of Little Dal carbonate rocks in the conglomerates, even though contacts of the conglomerates in all sections measured by the writer are conformable. The writer's opinion is that this contact is not the "major unconformity" suggested by Eisbacher (1978). Instead, the Redstone River conglomerates and red beds represent restricted sedimentation during a regional period of uplift, faulting and erosion (the Racklan-East Kootenay Orogeny) that produced the sub-Rapitan (= sub-Windermere) unconformity.

Marginal rocks of the Redstone River Formation include red mudstones, sandstones and 2 to more than 20 m of granule to boulder conglomerates and breccias. The massive to crudely stratified conglomerates are underlain and overlain by, and interfingered basinward with: well bedded conglomerates; planar to wavy bedded, ripple marked and trough cross-bedded, buff to red, pebbly sandstones; fine sandstones and siltstones. Desiccation-cracked red mudstones are draped over some pebbly horizons. Clasts in the conglomerates are mainly carbonate rocks from the Little Dal, with minor chert, sandstone, siltstone, and rare volcanic rocks also mainly from the Little Dal Group. These coarse clastic rocks are interpreted as proximal alluvial fan deposits, transported mainly by aqueous traction currents and subordinately by mass flows.

Toward centres of the embayments, these clastic rocks show a marked decrease in grain size and an increase in thickness to 800 m. The fine-grained clastic rocks are characterized by dark brick-red to maroon colour and markedly cyclic and rhythmic bedding. Small-scale rhythmic beds are one to several cm thick and consist of flat-laminated to ripple cross-laminated fine sandstone and siltstone which grade up to wavy and flat-laminated or massive mudstone[1]. The fining-upward is accompanied by darkening-upward from salmon red to maroon. In the Coates Lake embayment (Fig. XI-1) these red beds contain little or no evaporitic material, but abundant desiccation cracks. In contrast, many sections in the Keele and Hayhook embayments are rich in evaporites yet lack desiccation cracks. An analogous contrast occurs in the Permian Grayburg Formation, West Texas, in which Baria (1977) noted an inverse correlation between apparent paleosalinity and extent of desiccation crack development. Aside from evaporite content, the Redstone River rhythmites are uniform in grain size and sedimentary structures, including abundant scours at bases of beds and mud-chip breccias. Evaporite minerals occur as granule- to silt-size detrital particles, as authigenic prisms, as cement or very fine clastic material distributed homogenously throughout the mudstone, as discrete layers, and as late diagenetic, crosscutting to structurally conformable veins up to 10 cm thick.

Medium-scale rhythms are expressed in the Keele River embayment by 1 to 4 cm-thick beds of nearly pure gypsum which occur at 30 to 100 cm intervals within an otherwise continuous sequence of the above-described small-scale rhythms. Fining-upward cycles about 10 to 30 m thick occur in the transition zone at Coates Lake (see section on transition zone and Figure 4 for details). Rhythmicity is apparent in the Keele River embayment as alternating pale and dark red units about 10 to 20 m thick, comprising smaller scale rhythms as described above. The paler units are in general more recessive and more gypsiferous than the dark red units.

Parts of the Redstone River Formation consist of massive to indistinctly bedded dark maroon mudstones with dispersed detrital gypsum granules. Deformed bedding, including slump structures, convolute bedding, water escape structures and overturned small-scale foresets, is common in these units. Rare tabular and trough cross-bedded fine to coarse sandstones occur in basinal sections. Basinal units of the Redstone River Formation are interpreted as distal alluvial fan deposits of sheet floods which transported sediment by traction, in suspension and rarely by mass flow.

Within the top 100 m of the Redstone River Formation, especially in the Coates Lake area, there are one to several limestone beds in cyclic alternation with clastic red beds. These are here included in the Redstone River Formation and are described more fully under the heading "Transition Zone". At Coates Lake, a lenticular unit of sandstone above the top limestone bed is also included in the Redstone River Formation because of lithology, although it is thus stratigraphically equivalent to the basal subunit of the Coppercap Formation.

Coppercap Formation

The lower boundary of the Coppercap Formation is defined as the base of a thick sequence of carbonate rocks overlying Redstone River terrigenous clastic rocks (after Gabrielse *et al.*, 1973). The formation is characterized by orange to dark grey-weathering detrital limestones and dolostones with laminated and massive graded bedding and fetid shaly limestone interbeds. Where complete the formation is 200 to 300 m thick and can be divided into three regionally mappable subunits equivalent to the members of Gabrielse *et al.*, (1973).

The basal subunit of the Coppercap Formation includes 0 to 10 m of sandy, argillaceous and cryptalgal-laminated limestones and dolostones with disseminated iron and copper sulphides. These are overlain by up to 30 m of rhythmically bedded, graded, orange-buff-weathering, grey clastic dolostones interbedded with shaly limestone or dolostone. The clastic dolostone beds are 5 to 20 cm thick, colour- and texture-graded, and massive to indistinctly laminated. Tops of these beds are commonly pustular and algal in appearance, and the intervening 1 to 5 cm shaly carbonate beds also have a cryptalgal-laminated appearance. Bases of graded beds are locally scoured, and there are sedimentary folds, faults, boudinage, water escape structures and horizontally oriented intraformational flat chip breccias. Some of the breccia beds pass laterally through partly broken up to relatively undisturbed beds. No desiccation cracks are apparent. This unit could be interpreted as allodapic

[1] The term *mudstone* is used here for a rock of clay to silt grade, without fissility.

(Meischner, 1964), i.e. turbiditic carbonates, that were deposited in water shallow enough to be within the photic zone for algal growth. This environment would be analogous to that of deepwater stromatolites of the Pethei Group, Great Slave Lake (Hoffman, 1974).

The second subunit consists of 10 to over 70 m of recessively weathering, black, fetid, iron sulphide-bearing calcareous shale and platy, shaly limestone. Rare graded beds and irregular, non-polygonal shrinkage cracks (synaeresis?) are present. The base and top of this unit are gradational.

Rhythmically bedded grey calcarenites to calcilutites with shale interbeds compose most of the third and thickest (about 150 m) subunit. Sedimentary structures include massive to indistinctly laminated graded beds, slump balls, flame structures, scours at the bases of graded beds, flat-chip intraformational breccias, and rare ripple drift cross laminae as part of a Bouma cycle. Clastic beds range from 1 cm to several decimetres in thickness. Calcareous shale interbeds are rarely more than several cm thick. They have streaky, crinkled and flat laminae and locally have a dark red colour on bedding plane surfaces although they are mainly dark grey to black. Another characteristic rock type of the third subunit is mm-laminated, partly silicified coarse calcilutite which weathers to a distinctly ribbed surface. The middle part of this subunit is generally silicified and hosts well spaced stromatolite bioherms (Figure 2). Identical bioherms are located at other stratigraphic positions, hence stromatolite bioherms do not constitute a useful marker horizon as suggested by Eisbacher (1977, 1978).

The top 20 m of the third subunit includes a variety of rock types unique to this stratigraphic level. These include: coarse allodapic limestone breccias, bioherms of poorly preserved algal stromatolites (also present lower in the Coppercap, silicified collapse? breccias, and mottled grey, black, coarse crystalline limestone (a paleoweathering phenomenon?).

In summary, most of the Coppercap Formation is resedimented carbonate clastics with textures and structures similar to the allodapic limestones of Meischner (1964). This is in agreement with observations of Eisbacher (1977). Similarities are also apparent with other turbiditic limestones, such as Silurian to Lower Devonian basin and basin slope limestones of Nevada (Matti *et al.*, 1975). Turbidity currents were probably the main depositional mechanism for resedimented carbonate rocks of the Coppercap Formation.

Contact Between the Coppercap and Sayunei Formations

The Coppercap Formation is unconformably overlain by the Rapitan Group, of which the Sayunei is the basal formation, along most of the copper belt. This contact is part of the major break which marks the top of the Mackenzie Mountains Supergroup and has been termed the Racklan Orogeny (Gabrielse *et al.*, 1973). However, conformable relations are suggested in the Keele embayment by lateral continuity of distinctive marker units: coarse allodapic limestone breccia and mottled limestone, at the top of the Coppercap Formation. In the Keele, Coates Lake and Thundercloud embayments there are also sections where the contact between clastic limestone of the Coppercap and maroon shale and siltstone of the Sayunei is gradational and/or interfingered. These conformable relations are not proven, as the structurally conformable contacts could represent disconformity, and the gradational to interfingered contacts could be the result of reworking of the upper Coppercap during Rapitan time. Nevertheless, the writer favours a small time period separating the Coppercap and Rapitan, noting that the Coppercap must have been partly unlithified in order to have been reworked by the Rapitan in the observed fashion. The writer does not necessarily accept the proposed intra-Sayunei unconformity postulated by Helmstaedt (Eisbacher, 1978, p.54), but if folding did occur during Sayunei time it could represent a more extensive time period than the contact at the base of the Sayunei.

The nature of the Coppercap Formation and contact relationships with the Rapitan are important prospecting tools for at least two reasons. First, the gypsum subunit of the Little Dal Group (Aitken, 1977: see Table XI-1) has been mistaken for the Redstone River Formation because both are red bed-evaporite sequences. However, the allodapic limestones of the Coppercap are unique to the uppermost part of the Mackenzie Mountains Supergroup and are the best way to confirm the identity of the underlying Redstone River Formation. Second, copper mineralization appears to be better developed in areas such as Coates Lake where the Coppercap Formation is relatively thick.

Conformable relations between the Coppercap and Rapitan in thickest parts of the Redstone River-Coppercap succession suggest the following:
(1) factors causing embayments of the depositional basin were active during Redstone River, Coppercap and basal Rapitan time (also suggested by Eisbacher, 1977),
(2) these factors influenced the depositional thickness of the Coppercap Formation and
(3) the thickness of the Coppercap is more or less proportional to that of the Redstone River and not governed totally by sub-Rapitan erosion. The Coppercap Formation, a dominant cliff-former in contrast to the very recessive Redstone River Formation, is thus more available for stratigraphic prospecting.

In earlier work (Young, 1977; Jefferson and Young, 1977) it was proposed that the Wynniatt Formation on Victoria Island (Thorsteinsson and Tozer, 1962) corresponds to the Coppercap and that the base of the Wynniatt is promising for copper mineralization. Contrary to expectations, the Wynniatt Formation is characterized by molar-tooth structure, oolitic grainstones and stromatolites, hence is more likely to correspond to the upper carbonate subunit of the Little Dal Group as proposed by Young *et al. (in press)* and Aitken *et al.*, (1978).

Transition Zone

The contact between the Redstone River and Coppercap Formations is intercalated to gradational and records shoreline conditions during abrupt to gradual marine transgression. The transition zone is here defined as the stratigraphic interval within which sedimentary facies are transitional between those with a dominantly terrestrial aspect (Redstone River Formation) and those with a dominantly below-wave-base marine aspect (Coppercap Formation). The zone thus comprises a wide variety of types and thicknesses of facies throughout the Redstone copper belt. Included in the zone are intercalated red beds, bedded and brecciated evaporites, and carbonate beds at the top of the Redstone River Formation; and

algal carbonates at the base of the Coppercap Formation.

Disseminated copper sulphides occur within the transition zone in most areas where it outcrops within the study area. Some contacts which represent marine shoreline conditions lower in the Mackenzie Mountains Supergroup are also cupriferous, though not to the extent of the transition zone. Examples include: the contact between equivalents of Map-Unit H1 (P2 of Cook and Aitken, 1969) and Tsezotene Formation (P3, *ibid.*) in the Brock Inlier (inset, Fig. XI-1); carbonate units within the Katherine Group (C. Lord, pers. comm. 1977); lower and upper contacts of the gypsum subunit of the Little Dal Group; and the base of the Redstone River Formation. Basal Sayunei Formation is also host to copper sulphides (Kirkham, 1974).

Occurrences within the transition zone range greatly in grade, strike length and thickness, and the only laterally consistent grades so far reported are in the Coates Lake area. Results of drilling by Shell as part of their option agreement with Redstone Resources were published in the Northern Miner on May 20, June 17 and July 1, 1976; and June 30, 1977. Grades of 3.0 to 6.2% copper and 0.3 to 0.6 oz silver were reported over thicknesses of 3 to 5 feet (0.9 to 1.5 m) in an area of about 19,000 by 5,000 feet (5,800 by 1,500 m). Reported tonnages include at least 23,000,000 tons of 2.7% copper over an average 80 cm mining width (J. Ruelle, oral presentation, Yellowknife, 1977).

The transition zone in the Coates Lake area was first described by Coates (1964) as the "Cupriferous Zone". Watson and Mustard (1973), Kirkham (1974) and Watson *et al.* (1975) have provided additional observations. The following description is after Coates' (1964) detailed, but unpublished thesis. The zone is up to 110 m thick and cupriferous limestone beds are recognized over a lateral distance of 8 km, with a possible original lateral extent of over 30 km. The zone comprises up to seven cycles of maroon fine sandstone to mudstone rhythmites which thin, fine, and become less crossbedded upward. These clastic cycles are separated by cupriferous, gypsiferous, cryptalgal laminated limestone beds as shown in Figures XI-4 and 5. At section CJ-78-4 (Fig. XI-4) the top limestone bed is overlain by white to buff, calcareous, pyritic, coarse to medium grained, large scale trough crossbedded quartzose sandstone. The sandstone unit is about 6 m thick at section 4 and pinches out within 1 to 2 km to the north and west, becoming finer grained and dominantly planar laminated in the process.

The cupriferous limestone beds are generally continuous over distances of several kilometres although some swell or pinch out entirely as shown in Figure XI-6. The grey limestone weathers to grey and brown and locally contains conspicuous malachite and azurite colours of green and blue. Primary textures include flat to crinkly and pustular cryptalgal laminae (Fig. XI-7), gypsum prisms and prism casts, and mm-sized pods that may have been fenestrae or evaporite nodules (Fig. XI-8). Very recessive, white to pale buff, gypsiferous mudstones commonly underlie and overlie the limestones. These are in turn bounded by reduced, buff to green, calcareous mudstones. The zone of reduction about each bed ranges from less than 10 cm to more than 4 m thick, and is roughly proportional to the thickness of the limestone (Figs. XI-5, 6).

Primary copper sulphides occur within the carbonate beds and much less so in the reduced mudstones immediately above and below the carbonates. No copper sulphides were observed within the red beds. According to Coates (1964) the primary sulphides, in decreasing order of abundance are: pyrite, chalcopyrite, bornite, digenite, chalcocite, covellite, tennantite and galena. Also present are: supergene malachite, azurite, native copper and iron oxides. There is an antipathetic and vertically controlled zoning between pyrite and copper sulphides over the entire transition zone. The lowest mineralized beds are the richest, with abundant bornite, digenite, chalcocite and chalcopyrite but no pyrite. Overlying mineralized beds contain only chalcopyrite and pyrite.

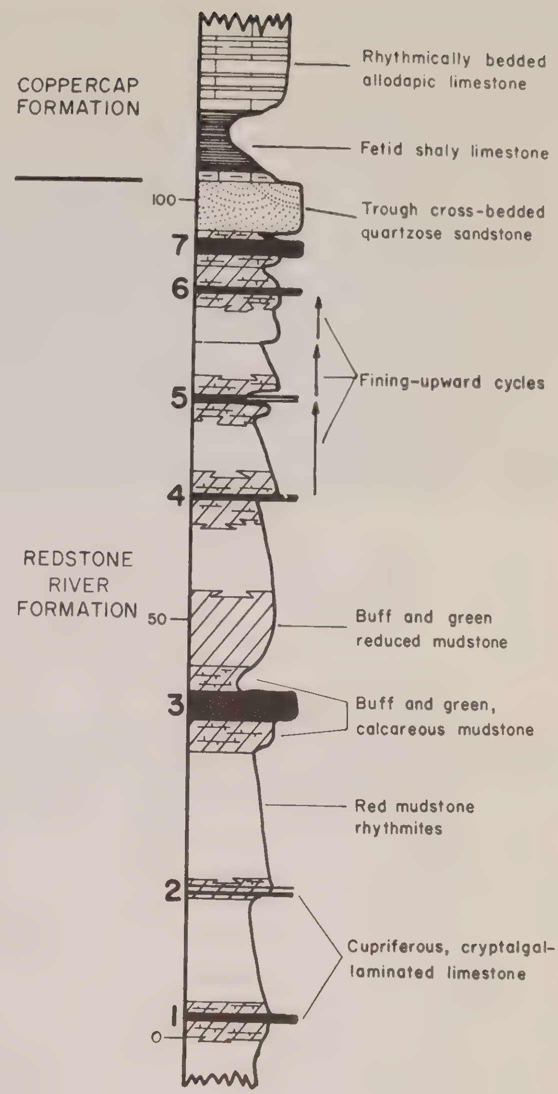

Figure XI-4: Stratigraphic section from CJ-77-4 showing the transition zone at the south end of Coppercap Mountain, Coates Lake. Location of this section is shown in Figure XI-1.The exaggerated weathering profile illustrates the apparent fining-upward nature of red bed units between resistant cryptalgal limestones. Large numbers refer to mineralized limestone beds; small numbers give vertical scale in metres.

In other embayments to the north, the transition

Figure XI-5: Cupriferous limestone bed 1 in outcrop at section CJ-77-4 with sedimentary units enhanced by black lines. Note, in vertical succession: red mudstone rhythmites (no pattern); buff, reduced mudstone rhythmites (dashed pattern); buff, calcareous reduced mudstone rhythmites ("T" pattern); recessive white gypsiferous mudstone (dense lined pattern); cupriferous algal limestone (brick pattern); and repeated units above. Note gradational contacts between red, buff and buff calcareous mudstones. Pogo stick is 1.5 m long with divisions of 20 cm.

zone shows much lateral variability and other differences from the zone at Coates Lake. Only one or two transitions from red beds to carbonate beds are apparent at the contact between the Redstone River and Coppercap Formations (Fig. XI-9). In thin marginal sections the contact is sharp to gradational over 1 to 3 m, from maroon mudstones through grey, green and purple calcareous mudstones to white, sulphide-rich algal-laminated limestones and buff dolostones. At sections where the red beds are highly evaporitic, for example the east end of 'Hutch Mountain' in the Keele River embayment, the top of the Redstone River Formation comprises lenses of bedded, malachite-stained gypsum up to 1 m thick and several hundred metres long. One or two reduced cupriferous beds, but no pure carbonates, are present within the gypsiferous red beds. Red calcareous mudstones overlie the gypsum zone and grade upward through grey-green mudstones and cupriferous algal limestones, to blue-green argillaceous dolostone and buff, rhythmically bedded dolostones of the Coppercap Formation. The algal textures are dominantly pustular (Fig. XI-10) rather than laminated as at Coates Lake. Laterally adjacent to the gypsiferous sections the stratigraphy is identical except for the absence of gypsum lenses.

The thickest parts of the transition zone, near the centres of the Keele and Hayhook embayments, include poorly exposed pods or lenses of bright orange- and yellow-weathering, malachite-bearing, brecciated mudstones and limestones. Brecciation ranges from in-place fracturing to rotation and limited lateral displacement. The brecciated units are crudely layered, and clast types reflect their stratigraphic

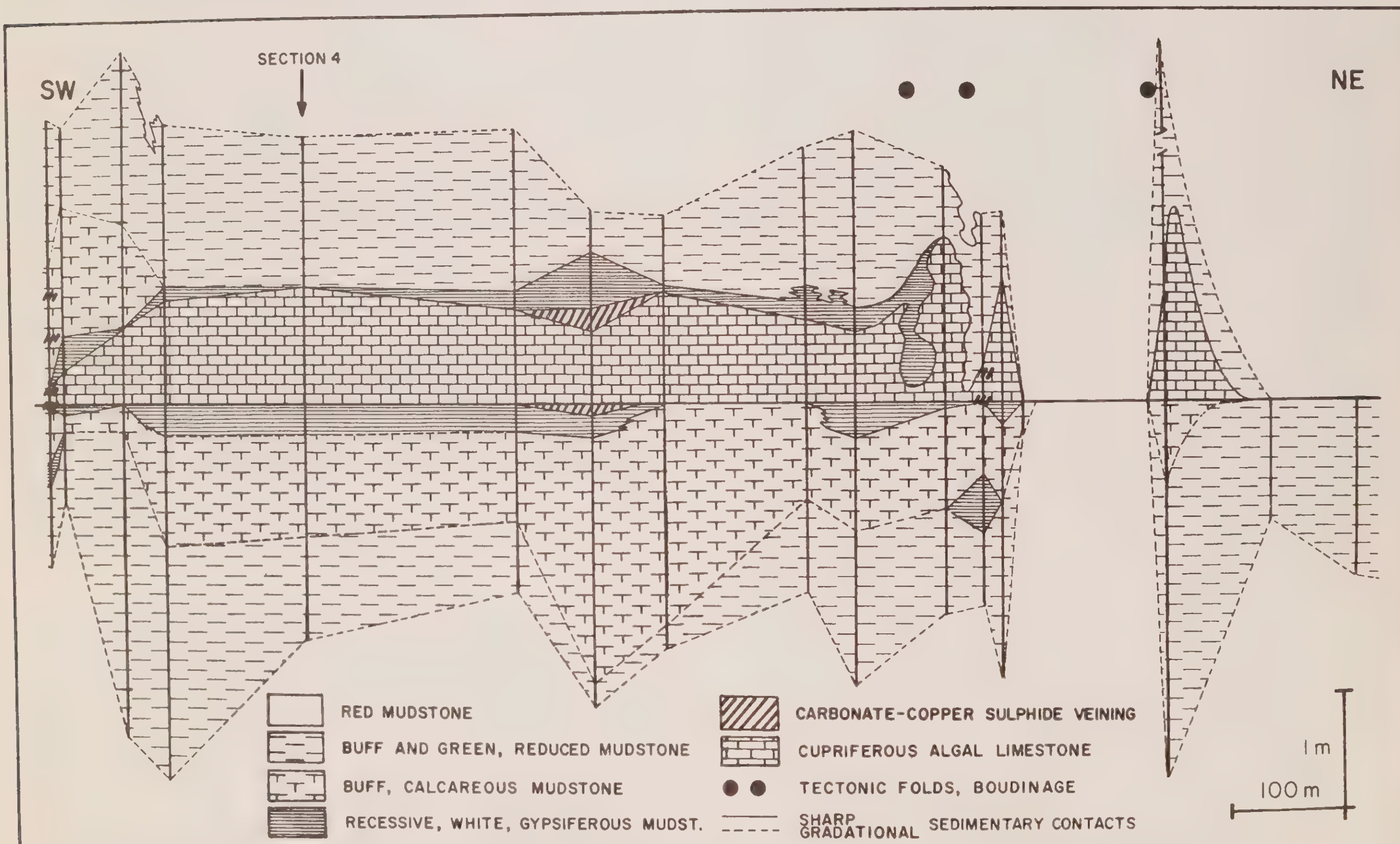

Figure XI-6: Fence diagram of cupriferous limestone bed 1, from cliff exposures southeast of Coates Lake. Note that thickness of the buff mudstones varies roughly in proportion to that of the cryptalgal limestone bed. Thickening and thinning of the limestone is mainly sedimentary in origin. Vertical exaggeration is about 100:1.

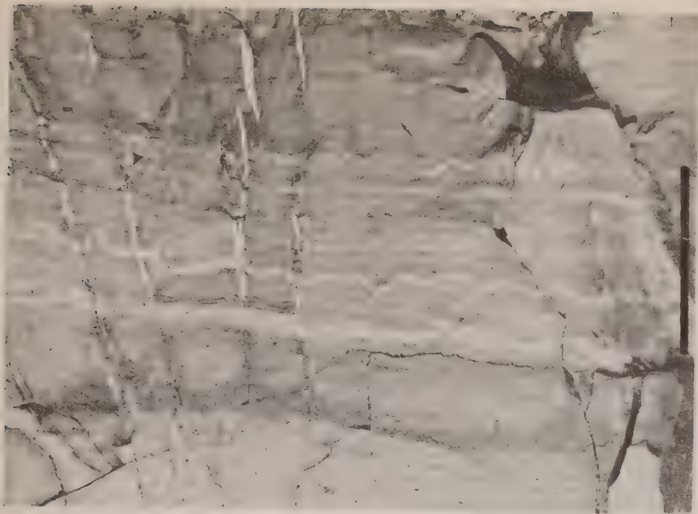

Figure XI-7: Crinkled and flat cryptalgal laminae from top limestone bed at section CJ-77-11, north of the South Redstone River. This is typical of cupriferous limestone beds 1 to 7 in the Coates Lake embayment (see Figure XI-4). Bar scale equals 10 cm.

Figure XI-8: Sample CJ-77-59 from the western extremity of the Hayhook embayment, showing nodular texture in cryptalgal limestones typical of the transition zone. Nodules are filled mainly with calcite and quartz and rimmed with pyrite. Scale is in cm.

Figure XI-9: Transition zone at the east end of Hutch Mountain (informal), Keele River embayment. Black and white arrows indicate thin buff and green cupriferous beds. The upper horizon (white arrow) indicates also the approximate base of the Coppercap Formation. Prominantly weathering white rock is mainly gypsum; dark rock interbedded with gypsum is maroon mudstone. Top of the view shows rhythmically bedded buff dolostone of the basal subunit of the Coppercap Formation. About 20 m of the section are shown here.

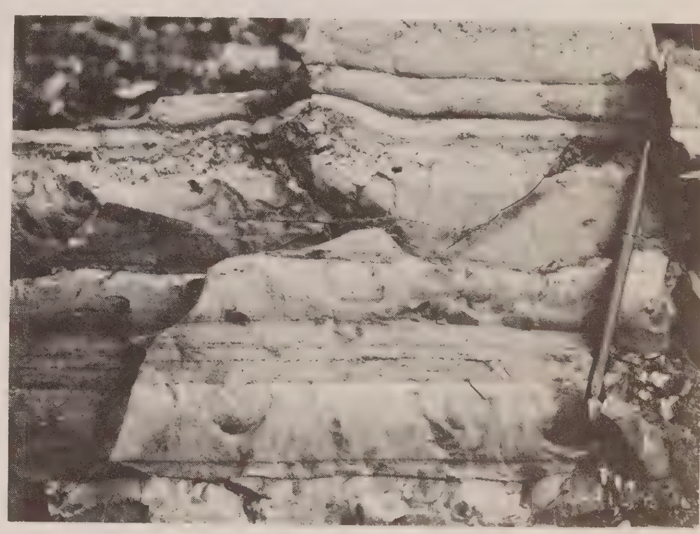

Figure XI-10: Typical lithology in upper transition zone, within basal subunit of the Coppercap Formation, southeastern Keele River embayment. Texture- and colour-graded clastic dolostone beds are interbedded with flat cryptalgal laminated carbonate with nodular texture (see Fig. XI-8). One graded bed has a pustular, fenestral appearance at the top. Pen for scale is 14.3 cm long.

At embayments other than Coates Lake, laterally continuous mineraliztion was not observed. In thicker basinal sections barren strata with identical algal textures and sedimentary structures occur immediately adjacent to copper mineralized carbonates. At marginal sections the transition zone is generally thin and mineralization consists only of sparse malachite. At several places in the Keele and Hayhook embayments samples containing up to 25% chalcocite, bornite and chalcopyrite were collected from colourful float below scree-covered occurrences. The

Figure XI-11: Chalcocite and bornite delicately outline fine laminae and other small-scale primary to early diagenetic textures and structures in sample CJ-77-38D from cupriferous limestone bed 1 near section CJ-77-4 (Fig. XI-4). Secondary bornite and sparry calcite vein at top of sample is concordant with the bedding. Main divisions of scale are in cm.

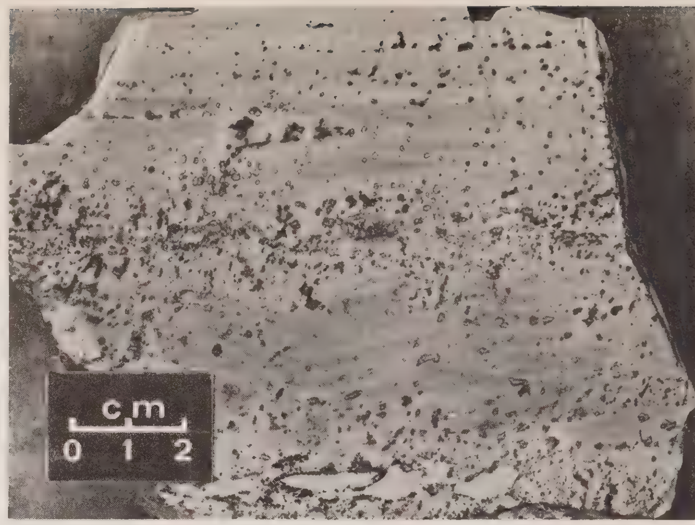

Figure XI-12: Chalcopyrite rimmed with supergene malachite is disseminated throughout this finely cross- and wavy-laminated buff, calcareous siltstone, sample CJ-77-255 from immediately beneath limestone bed 1 at Coates Lake.

stratigraphic context and lateral extent of these occurrences are not apparent.

Sulphide zoning in other embayments is not as clear as at Coates Lake, but in general shows the same upward and outward decrease in the copper:iron ratio. The main showing at Hayhook Lake is an exception, in that chalcocite and bornite occur at the top of the mineralized outcrop and chalcopyrite at the bottom. This discrepancy may be due to structural complications.

Throughout the copper belt, sulphides tend to occupy primary or early diagenetic pore spaces in the carbonate rocks or green and buff mudstones, and outline delicate sedimentary structures (Fig. XI-11). The pores include sedimentary fractures, spaces between clastic grains, and partly or wholly dissolved or replaced evaporite crystals and nodules. In rocks where coarse calcilutite beds are fissured and intruded by sedimentary calcarenite dykelets, the coarser grained dykelets are preferentially mineralized. Finely disseminated sulphides are, however, abundant elsewhere within the calcilutites and calcareous mudstones (Fig. XI-12). The proposed replaced evaporite nodules (Fig. XI-8) are circular to oval in cross-section and range in diameter from 1 to over 20 mm. They are filled with calcite, dolomite or quartz and rimmed with or filled mainly with sulphides.

In breccia lenses, the breccia fragments themselves are preferentially mineralized instead of the large spaces between fragments. Some delicately mineralized carbonate layers have been penecontemporaneously faulted and the sulphides are smeared out along minute fault planes. At many localities small discontinuous horizontal and vertical fractures are filled with sulphide or carbonate-sulphide veinlets where the primary mineralization is of high grade (Fig. XI-11).

ORIGIN OF COPPER MINERALIZATION

Sabkha conditions during a marine transgression are implied by desiccation cracks, algal laminae and ripple marks in sedimentary rocks that are transitional between gypsiferous red beds and fetid detrital limestones. Such features are characteristic of sedimentary sabkha deposits described in the literature (for example, Renfro, 1974; Mendelssohn, 1961; Gill, 1977, Kendall and Skipwith, 1969). Temporary abundances of water are, however, suggested by the alluvial nature of the red beds intercalated with the algal carbonates. Water could have been provided by sporadic storms. Alternatively, perhaps the climate was highly seasonal with clastic sedimentation during wet periods and sabkha-type evaporite sedimentation during dry periods. Schmalz (1969) noted that much present-day commercial evaporite production is in regions with such strongly seasonal climates. Development of some kind of model not exactly similar to modern sabkhas is encouraged by the lack, in the transition zone, of such features as tepee structures, beach rock, algal biscuits, large gypsum rosettes, chicken wire textures, and aeolianites that typically occur in sabkha environments (for example, Assereto and Kendall, 1977).

The transition zone is interpreted to represent a more or less diachronous marine transgression from west to east. At sections on the Twitya River and on the north side of the South Redstone River, Coppercap Formation limestones apparently onlap onto the Redstone River Formation above or near the top of the transition zone. Distinctive beds within the Coppercap Formation can be traced to where they abut the transition zone, and the onlap relationship is apparent in distant views of the sections. These contacts, especially that near the South Redstone River, may have been created partly or entirely by asymmetric faulting. As in the case of detailed embayment configurations, more field work is required to study this problem.

At Coates Lake the cyclic nature of the transition zone implies successive partial marine transgressions to produce the limestone beds and repeated partial re-emergence and erosion to cause smothering of the carbonate beds by distal alluvial clastic sediments on a gently sloping surface, possibly within a valley surrounded by fault-bounded highlands. The cyclicity of the transgression at Coates Lake suggests a series of small-scale tectonic adjustments within a period of overall progressive epeirogenic subsidence. The irregularity in thickness of cycles and limestone beds at Coates Lake, coupled with the lack of such features in other embayments, suggests sporadic timing in keeping with local tectonic subsidence rather than (or in conjunction with?) regional sea-level fluctuations related to climatic factors such as the distant onset of Rapitan glaciation. Cycles of the same order of thickness, but different rock types are present throughout the Mackenzie Mountains Supergroup, and appear to be normal rather than unusual features of epicontinental sedimentation in this region. The lack of, or poor development of such cycles in other embayments of the copper belt may reflect (1) more abrupt and extreme local subsidence, or (2) exposure of strata deposited at slightly different times during regional diachronous transgression such that the small-scale tectonic adjustments expressed at Coates Lake occurred either before or after transgression was recorded in the other transition zones. Figure XI-2 is drawn to suggest support of this latter hypothesis.

The paucity of evaporites at Coates Lake relative to the Keele River and Hayhook embayments is puzzling. Perhaps at Coates Lake there was better drainage, dilution by fluvial waters, moister climate, or better access to marine circulation during transgression. Growth faulting as a control of sedimentation and diagenesis (Eisbacher and Gabrielse, 1977) is difficult to confirm in outcrop but provides a plausible mechanism to explain many of the observed sedimentary and stratigraphic differences between areas.

The white quartzite at the south end of Coppercap Mountain in the Coates Lake embayment is anomalous. Paleocurrent directions from large-scale trough cross beds are westerly in contrast to northerly directions from very small-scale cross beds and current lineations in underlying red beds. Within the quartzite bed, the change from trough cross bedding to planar lamination away from section 4 suggests than an ephemeral stream channel introduced already well sorted quartz sand at a point near section 4 and the sands were partially redistributed under upper flow regime conditions (sheet flood or beach processes?) to produce current lineated laminae.

Uniqueness of the Coates Lake area in medium and large-scale sedimentation and tectonics is parallelled by uniqueness in style and extent of copper mineralization. The Coates Lake area appears to be alone in having developed and preserved extensive stratiform copper deposits of potential ore grade and tonnage, although much work that has been done by Shell in the Keele River embayment and Rio Tinto in the Hayhook embayment remains confidential. It seems apparent that tectonics, sedimentation and mineralization are all linked in geologic history of the Redstone copper belt.

Small-scale sedimentary and mineralization features appear to have more similarities throughout the copper belt. Although no carbonaceous material was observed in the transition zone, the abundance of cryptalgal structures and the green to buff reduction zones in mudstones surrounding the cryptalgal limestones suggest that organic material could have played a role in sulphide precipitation. Bacterial reduction of sulphates to produce sulphides in accordance with the model proposed by Annels (1974) is suggested by the presence of sulphides rimming possible evaporite nodules, and by chalcopyrite casts after gypsum prisms.

Primary porosity of the sediments appears to have been a key factor during mineralization. Fine calcilutite, for example, would have had extremely high porosity when first deposited, but would have lithified and rapidly undergone a decrease in porosity and permeability. Finely disseminated copper sulphides that occur in such rocks are thus inferred to have been introduced at an early stage. Preferentially mineralized calcarenite dykelets in fine calcilutite provide further support for this inference. Very early mineralization is further suggested by preservation and enhancement of fine possible algal structures such as illustrated in Figure XI-11. This example could have been mineralized progressively within one or more cm from the sediment-water interface.

It is unlikely that hydrothermal mineralization would have preserved delicate primary sedimentary structures and textures. Epigenetic mineralization in the Little Dal Group and Coppercap Formation is commonly associated with obvious faults, brittle fracturing of host rock, and development of vugs filled with coarse crystalline calcite and dolomite. However, at least some of the stratiform copper seems to have been deposited or remobilized at a late diagenetic stage. For example, richly mineralized beds are locally enclosed by coarsely crystalline calcite veins and massive chalcopyrite and bornite veins up to 1 cm thick. Tectonic folds in mineralized beds commonly exhibit axial planar flattening of copper sulphide disseminations and pods. It is possible that late-stage aqueous leaching and re-deposition of copper sulphides along and near fault zones caused some of the lateral variations in mineralization that are apparent in outcrops in the Keele River and Hayhook embayments.

No single model of stratiform copper mineralization seems to apply to all of the features present in the Redstone copper belt. Copper mineralization seems to have been due to a number of processes, including: (1) syngenetic to diagenetic bacterial reduction of sulphates (Annels, 1974); (2) diagenetic introduction of copper by hypersaline brines (Bartholome *et al.*, 1972); (3) upward-moving terrestrial formation waters in a sabkha environment (Renfro, 1974), leaching copper, in one or more stages, from red beds derived partly from cupriferous basalts in the uppermost Little Dal Group, and perhaps (4) syngenetic to epigenetic fault-influenced remobilization or primary mobilization of copper to create podiform occurrences (Ahlfeld, 1967; Eisbacher and Gabrielse, 1977).

CONCLUSIONS

The important stratigraphic units associated with stratiform copper mineralization in the Mackenzie Mountains Supergroup are the upper carbonate subunit of the Little Dal Group, the Redstone River Formation and the Coppercap Formation. These were deposited along a northwest-trending embayed coast, and overlain by the Sayunei Formation of the Rapitan Group. Key

rock types are shelf carbonates of the Little Dal Group, terrigenous red beds, cryptalgal carbonates and evaporites of the Redstone River Formation, and turbiditic limestones of the Coppercap Formation.

Copper mineralization developed under evaporitic, sabkha conditions in sediments that were deposited during a period of marine transgression. Disseminated copper deposits at Coates Lake are stratiform and repetetive in up to seven laterally continuous beds of cryptalgal-laminated limestone. Elsewhere in the copper belt, disseminated copper sulphides occur at the same general stratigraphic position, but there is generally only a single red bed to limestone transition, and the occurrences are highly variable in thickness and continuity. Throughout the copper belt, sedimentary features of both host sedimentary rocks and sulphides support a syngenetic to early diagenetic age of mineralization.

Different styles of mineralization in different parts of the copper belt are apparently related to differences in tectonics and sedimentation. The Coates Lake embayment appears to have enjoyed tectonic hiati allowing access to quiet marine and sabkha conditions during several successive periods of transgression. Other embayments underwent transgression that was too rapid to allow significant development of algal laminites at shoreline conditions. They also appear to have had more irregular shoreline configurations causing rapid small-scale lateral facies changes, ponding and restriction of circulation of mineralization solutions, whether they were of marine reflux or formation origin. Secondary remobilization of copper related to growth faulting is also a possible consideration.

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IRON-FORMATION IN THE RAPITAN GROUP, MACKENZIE MOUNTAINS, YUKON AND NORTHWEST TERRITORIES.

G. Yeo, University of Western Ontario.

ABSTRACT

The Upper Proterozoic Rapitan Group in Mackenzie Mountains is a dominantly glacial-marine and marine clastic succession totalling nearly 2,700 m. Its basal contact is a regionally significant unconformity. In addition to its unusual stratigraphic characteristics, the Rapitan includes extensive hematitic iron deposits, probably the largest in North America outside the Lake Superior region. It is suggested that the iron was precipitated from iron-enriched sea-water under glacial-marine influence.

INTRODUCTION

The youngest sequence of Proterozoic strata in Mackenzie Mountains comprises the Rapitan Group (Gabrielse *et al.*, 1973) and the overlying Keele and Sheepbed Formations. Although there is evidence for a locally conformable contact with the underlying Coppercap Formation, the base of the Rapitan is generally unconformable. This contact, below which up to 4,500 m of strata is missing through erosion and/or non-deposition, is the major stratigraphic discontinuity of the Proterozoic succession in the Mackenzie Mountains. The name, Ekwi Supergroup, including the Rapitan Group and the overlying Proterozoic rocks, has been suggested for the Proterozoic sequence above this unconformity (Young *et al.*, in press).

The Rapitan Group, which contains one of the largest iron deposits in North America, crops out in an arcuate north and northwest trending belt about 630 km long (Fig. XII-2). Two major basins are recognized: the Snake River basin and the Mountain River - Redstone River basin. Generalized stratigraphic sequences for these basins are shown in Figure XII-1. Three units of formation rank comrpise the Rapitan as presently defined (Gabrielse *et al.*, 1973). These are briefly discussed below. Alternative stratigraphic subdivisions are outlined in Table XII-1. It is proposed here that the Rapitan Group be redefined to include only the lower glacigene formations, in keeping with its original usage (Green and Godwin, 1963). The introduction of a new group, the Hay Creek Group, to include the non-glacigene Upper Rapitan (Gabrielse *et al.*, 1973) and its partial facies-equivalent, the Keele Formation, is also suggested. Accepted Geological Survey of Canada usage (Gabrielse *et al.*, 1973) is followed in this paper, however.

Ziegler (1959) was the first to describe the Rapitan. Other workers who have described and discussed aspects of the regional stratigraphy include: Aitken *et al.*, (1973), Eisbacher (1976, 1977, 1978), Gabrielse *et al.*, (1973), Green and Godwin, (1963), Young (1976) and Young *et al.* (in press). The iron-formation has been discussed by Gross (1965, 1973), Stuart (1963), Young (1976), and Delaney *et al.* (in press).

STRATIGRAPHY OF THE RAPITAN GROUP

The Lower Rapitan in the Snake River basin (Table XII-1) (the Snake River Formation *in* Young *et al.* in press) consists of over 750 m of massive and stratified maroon and brown mixtites with orthoconglomerates

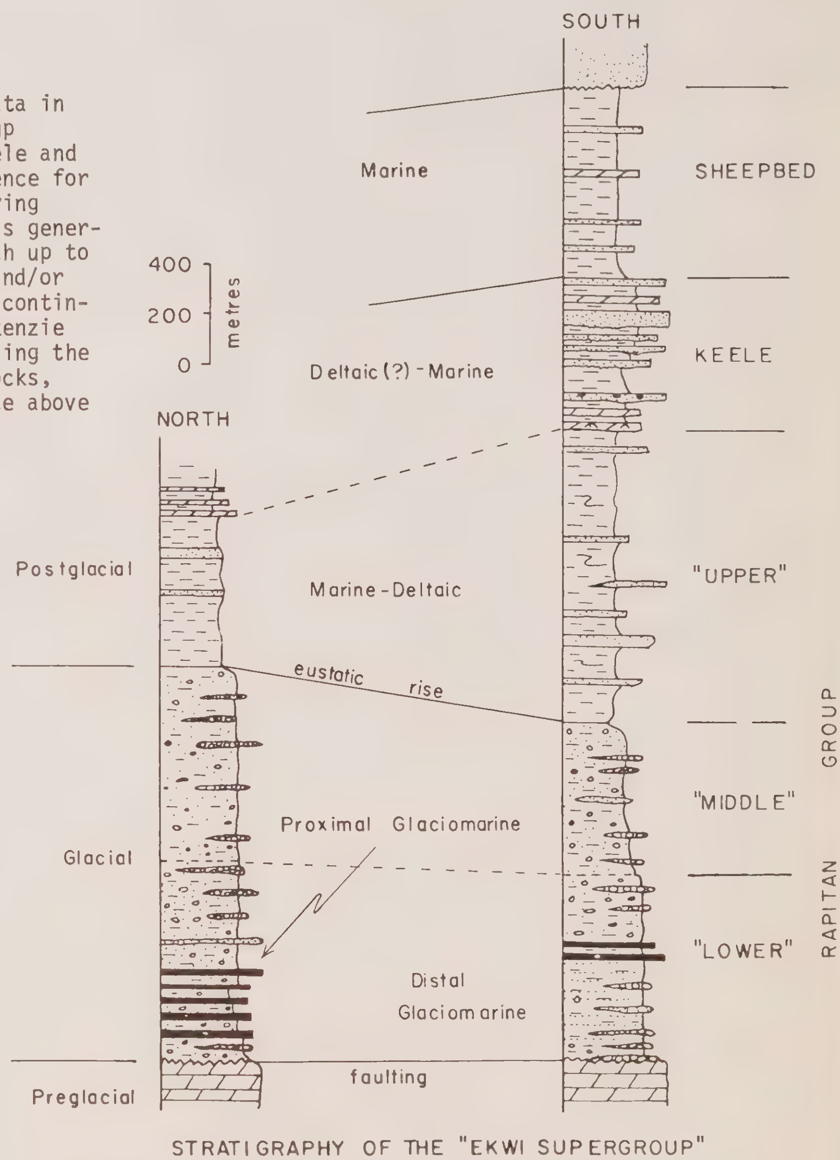


Figure XII-1: Composite schematic sections through the uppermost Proterozoic of 'Snake River basin' in the north and the 'Mountain River - Redstone River basin' in the south. Maximum thicknesses are given. The dark bands are iron-formation.

and sandstones (Fig. XII-1). The mixtites are interpreted as proximal glacial-marine deposits (i.e. tillites and flow tillites). Identical features are common in Pleistocene glacial-marine and glaciolacustrine deposits (e.g. Evanson *et al.*, 1977; Hicock and Dreimanis, (in prep.); Marcussen, 1973; Miller, 1953). The largest iron deposit in the Rapitan occurs in the lower part of this formation. To the south and east, in the Mountain River - Redstone River basin (Fig. XII-2), the Lower Rapitan (Sayunei Formation *in* Eisbacher, 1978) comprises at least three members and is as much as 730 m thick (Fig. XII-1). The lowest (Mt. Berg Member) consists of greenish mixtites and mudstones with some orthoconglomerate. The overlying member (Lukas Creek Member) comprises maroon mudstone rhythmites with sandstone, orthoconglomerate, and minor mixtite. The rhythmites are interpreted as distal glacial-marine deposits formed partly by turbidity currents. Similar deposits have been described by Banerjee (1966), Harrison (1975), Rattigan (1967) and others. The uppermost member (Mountain River Member) comprises maroon mixtite with lesser orthoconglomerate, mudstone and sandstone. Except for its colour it is similar to the overlying grey mixtites. The contact of this member with the grey mixtites is generally transitional. Evidence for glacial activity during deposition of the Lower Rapitan includes striated and faceted clasts, dropstones, till balls, till pellets, and possible ice-contact features (Young, 1976; Young *et al.*, (in press); Ziegler, 1959).

Overlying the Lower Rapitan is a moderately recessive grey mixtite unit, the Middle Rapitan (Shezal Formation *in* Eisbacher, 1978), up to 775 m thick with minor mudstone, sandstone and orthoconglomerate (Fig. XII-1). The mixtites are both massive and stratified and are interpreted as tillites and flow tillites. Glacial features similar to those found in parts of the Lower Rapitan (e.g. Snake River Formation *in* Young *et al.*, in press) are common. As in the Lower Rapitan, clast composition varies and carbonate,

TABLE XII - 1

STRATIGRAPHIC SUBDIVISIONS OF THE UPPERMOST PROTEROZOIC, MACKENZIE MOUNTAINS

	Possibility A	Possibility B						Current usage	
SUPERGROUP	UNIT	GROUP	SUBGROUP	FORMATION (Snake R. basin)	FORMATION (Mountain R. - Redstone R. basin)	MEMBER	DOMINANT LITHOLOGY	FORMATION	GROUP
Ekwi	Sheepbed Fm.			Sheepbed			shale	Sheepbed	
	Hay Creek Group	Rapitan	Hay Creek	Keele			sst.,lst., dol.,sh., cgl.	Keele	
				Twitya			shale	Upper Rapitan	Rapitan
	Rapitan Group		Thunder-cloud	Shezal			grey mixtite	Middle Rapitan	
				Snake River (maroon mixtite)	Sayunei	Mountain River	maroon mixtite	Lower Rapitan	
						Lukas Creek	maroon mudstone rhythmites		
						Mount Berg	green mixtite		

Table XII-1: Provisional stratigraphic subdivision for the uppermost Proterozoic rocks in the Mackenzie Mountains. The names 'Twitya', 'Shezal' and 'Sayunei' were used by Eisbacher (1978). Since the Lower Rapitan in the Snake River basin is unlike the Lower Rapitan in the Mountain River - Redstone River basin, it should be considered a separate (although possibly correlative) formation. The name 'Snake River Formation' is adopted from Ziegler (1959) who first described the Rapitan and recognized its tillitic nature. An appropriate reference area would be east of the Snake River along 'South Iron Creek' (Grid Ref. 8WNH8538) in the Crest prospect. Eisbacher (1978) also suggested that the Rapitan Group be expanded to include the Keele Formation since the Upper Rapitan (Twitya) and Keele Formations interfinger. In this case the recognition of subgroups within the expanded Rapitan Group would facilitate distinguishing between the glacigene lower part and the non-glacigene upper part. This is shown in the table as Possibility B. Because the sachems of Canadian stratigraphic nomenclature would discourage the introduction of subgroups, an alternative is proposed here. It is recommended that the Rapitan be restricted (following Green and Godwin's (1963) original definition) to include only the glacigene units and that a new group, the Hay Creek Group, be introduced to include the present Upper Rapitan (Twitya Formation) and Keele Formation. This is shown as Possibility A. The new stratigraphic names have been forwarded to the Geological Survey of Canada for consideration.

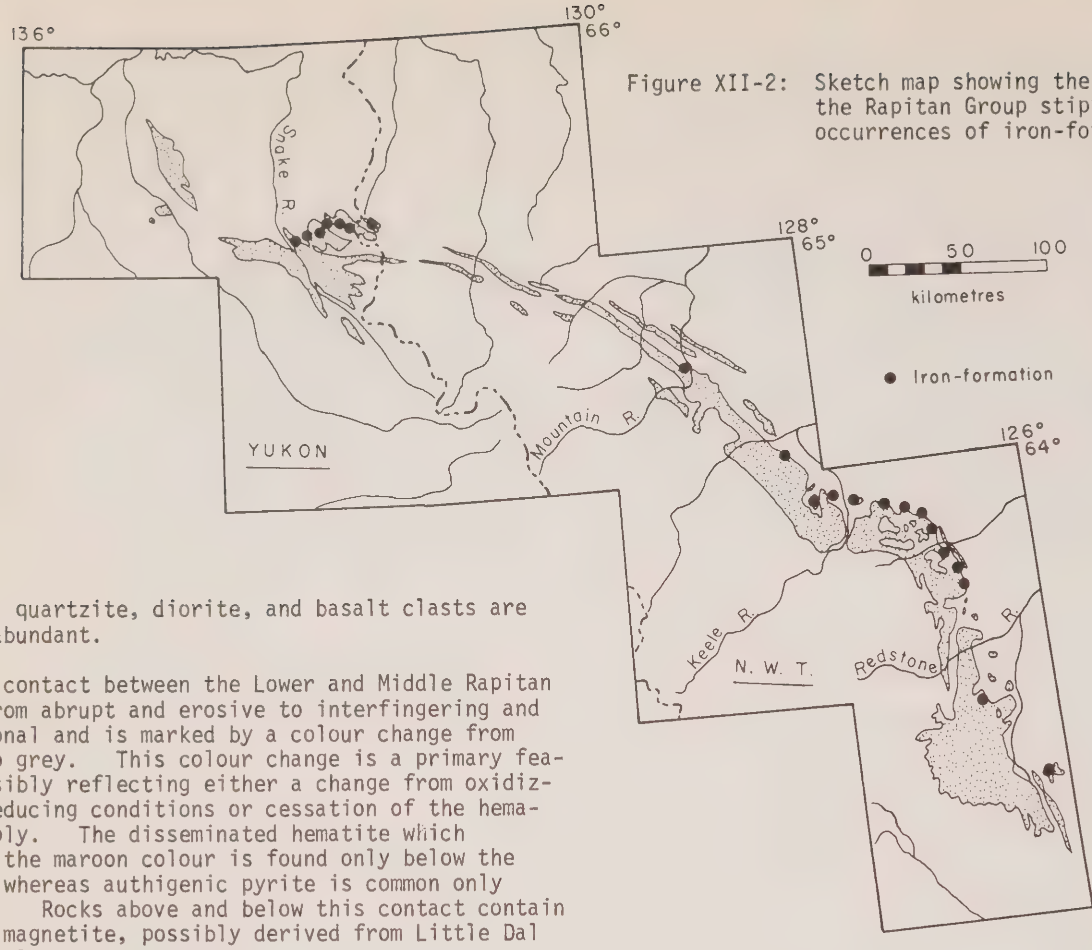


Figure XII-2: Sketch map showing the distribution of the Rapitan Group stippled and known occurrences of iron-formation.

mudstone, quartzite, diorite, and basalt clasts are locally abundant.

The contact between the Lower and Middle Rapitan varies from abrupt and erosive to interfingering and transitional and is marked by a colour change from maroon to grey. This colour change is a primary feature possibly reflecting either a change from oxidizing to reducing conditions or cessation of the hematite supply. The disseminated hematite which produces the maroon colour is found only below the contact, whereas authigenic pyrite is common only above it. Rocks above and below this contact contain detrital magnetite, possibly derived from Little Dal Group basalts.

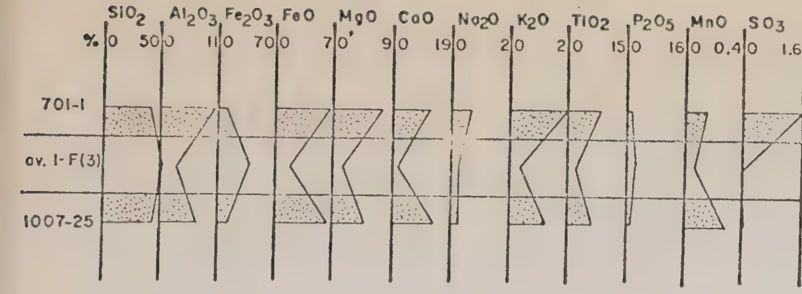
The Upper Rapitan (Twitya Formation *in* Eisbacher, 1978) up to 1,170 m thick, consists of recessive, laminated mudstones with occasional sandy and calcareous beds (Fig. XII-1). Its lower contact appears sharp and even. Local unconformity is reported (Gabrielse *et al.*, 1973). The upper contact is commonly transitional with the overlying Keele Formation. Interfingering between the Keele and Upper Rapitan demonstrates facies equivalence (Aitken *et al.*, 1973; Eisbacher, 1976, 1977). No evidence of glacial activity has been found in this formation which thus represents a return to normal marine conditions after melting of the glacial ice.

Paleocurrent data for the Rapitan Group indicate source areas to the east and northeast. Measurements from the northwest part of Snake River basin showing transport from the west and northwest suggest that the depositional basin, at least at its north end, was not very wide.

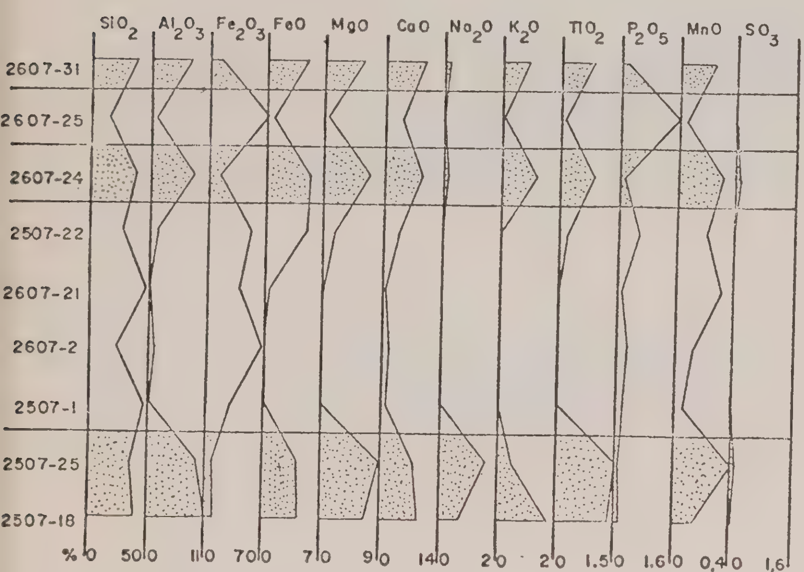
Support for the tensional tectonic regime proposed by Eisbacher (1977) for later Proterozoic time in the Mackenzie Mountains area includes paleo-scarps exposed at a number of localities which probably mark north-trending faults active immediately before and possibly during early Rapitan time. Evidence cited by Eisbacher (1978) for orogeny or tectonic compression during early Rapitan time is not convincing. The folded Coppercap strata exposed west of Keele River in Sekwi Mountain map-area (Eisbacher, 1978) could also be interpreted as either (1) much younger (Laramide?) folds involving a more competent sheet (the carbonates) between relatively homogenous, less competent rocks: gypsum below and siltstone above; or (2) penecontemporaneous, large-scale slump folds. Possibly analogous deformation is discussed by Johnson (1970, pp.219-247) and Dennis and Hall (1978). The crucial feature, the orthoconglomerate that is supposed to truncate the folds, appears to be folded as well, although more gently. Exposure of this conglomerate is poor, but it does not appear to be a continuous, sheet-like unit. Rapitan orthoconglomerates are typically lenticular (e.g. Eisbacher, 1976). In any case, it is difficult to reconcile a dilational tectonic regime with compressional features. Deformation of this sort has not been observed elsewhere in the Lower Rapitan and Coppercap. However, both large- and small-scale intraformational folds and slump features are locally common throughout the Rapitan. Spectacular carbonate olistoliths seen in the Upper Rapitan in Mountain River area suggest active tectonism at this time.

THE IRON-FORMATION

Banded iron-formation is widespread in the Lower Rapitan (Fig. XII-2). Abundant dropstones in the iron-formation and association with glaciclastic sediments indicate that this chemical sediment was deposited under glacial conditions. Three facies of jasper-hematite iron-formation are present: a laminated facies associated with mudstone rhythmites, a nodular facies associated with mixtites and coarse clastics, and an 'irregular' facies comprising irregular masses and intergrowths of jasper and hematite (Stuart, 1963). All three intergrade. Textural and geochemical evidence suggest that the latter two facies were enriched in iron during early diagenesis. Major element chemical analyses are summarized in Figure XII-3. Minor jasper-magnetite iron-formation has been found locally in the lower part of the Middle



NORTH REDSTONE RIVER



DISCOVERY CREEK

Figure XII-3: Graphic representation of major element variation in sections at Discovery Creek ('Snake River basin') and near North Redstone River. The iron-formation at Discovery Creek is predominantly nodular and the sediments (stippled pattern) are maroon mixtites. The iron-formation at North Redstone River is predominantly laminated, with grey mixtites above and maroon rhythmites below. Note the relatively greater iron content of the diagenetically altered nodular iron-formation from Discovery Creek. The iron-formation is essentially depleted in everything but silica, ferric iron, and phosphorus.

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W.A. Padgham and C.C. Lord critically read an earlier draft of this report.

apitan. Reserves in excess of 20 billion tons have een estimated from the Snake River basin alone, with billion tons averaging 47.2% Fe minable by open pit ethods within a ten square mile area (Stuart, 1963).

Iron might have been derived through hydrothermal eaching of oceanic crust (Fig. 4a and 4b; Seyfried nd Bischoff, 1977; Delaney *et al.* in press) infered to have lain west of the present outcrop belt Eisbacher, 1977). Gross (1965) suggested that iron as derived through fumarolic activity, possibly via erruginous breccia diatremes known to intrude rocks nderlying the Rapitan in Wernecke Mountains. Water irculation beneath an ice shelf may have provided the verturn necessary to bring about upwelling of the ron-enriched seawater (Fig. XII-4a). Precipitation f iron and silica would then take place under the nfluence of the strong temperature and chemical (e.g. l, salinity, ionic concentration, etc.) gradients hat must exist near a glacial coast (Fig. XII-4a and).

The occurrence of similar iron-formations in her late Proterozoic glaciclastic sequences (Fig. I-5) to which this depositional model might be plied, suggests that these represent a new class of on-formation of worldwide distribution.

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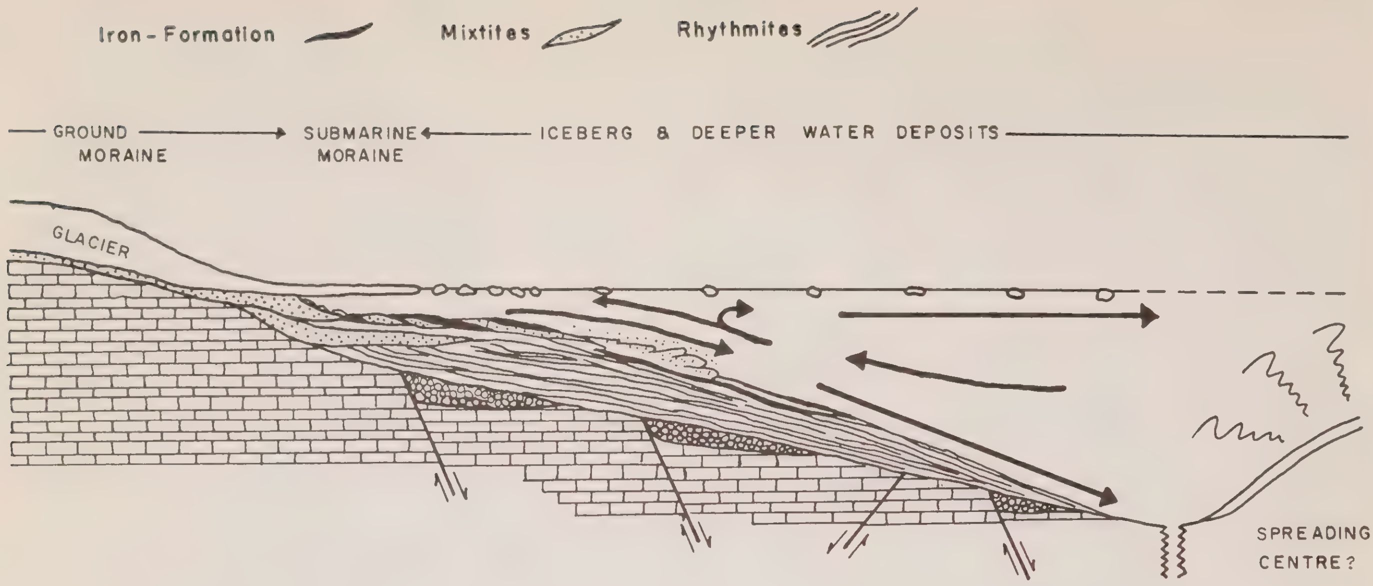

Figure XII-4a: In the model presented here, iron and silica precipitate from metal-bearing seawater from a nearby spreading centre or rift system upon mixing with cold, relatively alkaline, fresh water in the vicinity of a sea-going ice-sheet. Finely laminated iron-formation is precipitated in turbidite deposits distal to the ice margin and sediment supply, while more massive, lenticular, nodular iron-formation is formed in the zone of maximum sediment supply near the ice margin. Iron-formation may also precipitate beneath the ice shelf. The circulatory pattern involved (after Weyl, 1970) is undoubtedly more complex in reality.

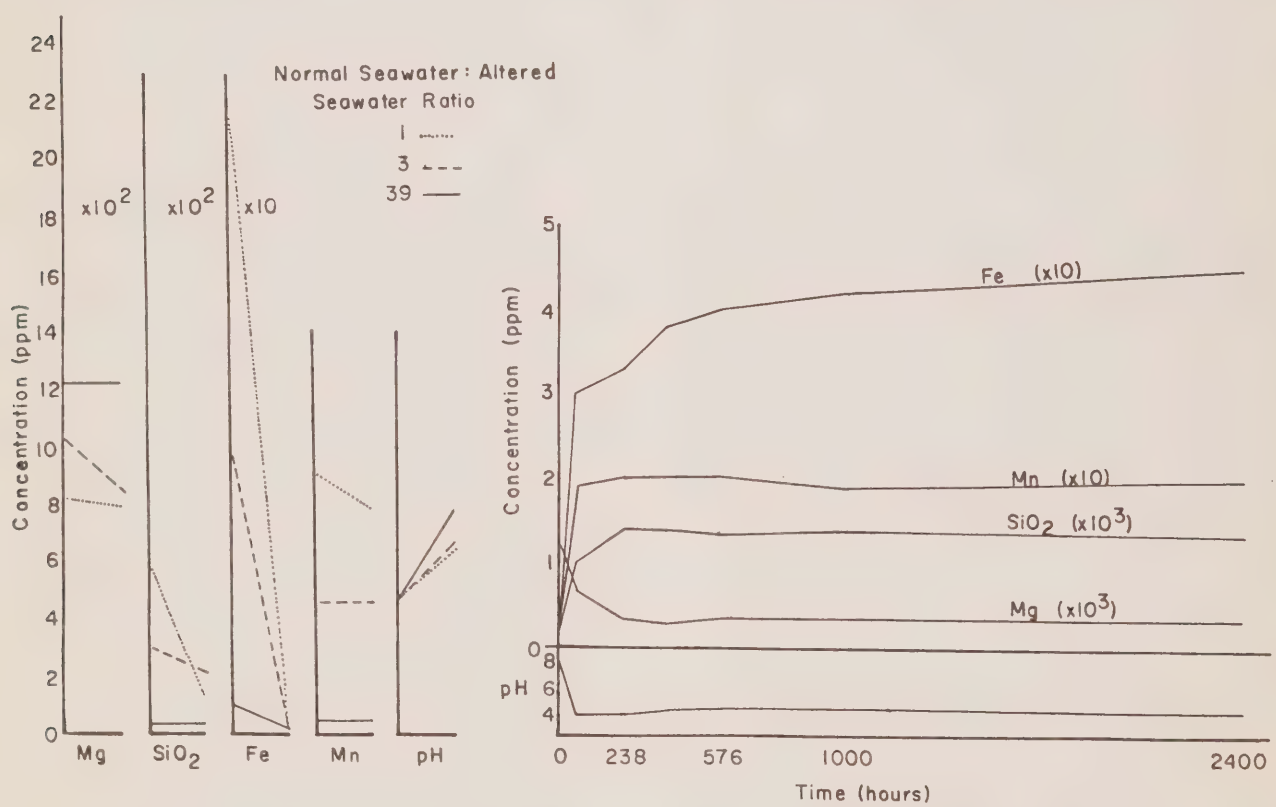

Figure XII-4b: The model presented here for glacigene iron-formation is reinforced by the experimental work on basalt-seawater interaction by Seyfried and Bischoff (1977). Their results are graphically summarized here. The diagram on the right shows the rate of increasing concentration of dissolved species in a seawater-basalt mixture of 50:1 at 260°C and 500 bars, conditions analgous to those which may exist at a spreading centre. As can be seen, Fe and Si are most effectively dissolved. The diagram on the left shows the amount of precipitation of these elements after dilution with normal seawater in varying amounts for 24 hours at 25°C. At lower temperatures the rate of precipitation would be even greater. It can be seen that Fe precipitates most rapidly and Mn least rapidly, thus effectively separating them. Rates of precipitation of Fe and Si would vary with dilution and temperature giving rise to the laminations of iron-formation.

Figure XII-5: Late Proterozoic glacial deposits of the world (after Schermerhorn, 1974, and others). Glacial deposits with associated iron deposits are shown as dark squares. Stable cratonic areas (probable continental areas) prior to the Pan African orogeny (600 m.y.) are shown in stippled pattern. The Pangean configuration of the continents as shown (after Hughes, 1975) is probably not accurate but is presented as an approximation to the actual interrelationship of cratonic areas in the late Proterozoic.

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INDEX

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North of 60

Mineral Industry Report 1976, Northwest Territories

EGS 1978-11

C. Lord
P.J. Laporte
W.A. Gibbins
E.J. Hurdle
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CONTENTS

LIST OF FIGURES

LIST OF TABLES

INTRODUCTION

W.A. Padgham[1]

Mining and the search for minerals continued to be the most important industrial activity in the Northwest Territories, as it has been for many years. This report describes exploration for and development of mineral properties, and mining activities in the N.W.T. during 1976. Four District Geologists, one in each of the Nahanni, Keewatin, Mackenzie and Arctic Islands Regions (Fig. I-I) monitored the mineral industry during the year.

A continued concentration of base metal exploration in the Slave Structural Province and extensive interest in the uranium potential of the adjacent Bear Province required further delegations of areas south of Great Slave Lake to the Arctic District Geologist. Exploration has declined significantly in the Arctic Islands and in the Cordillera but with accelerating interest in uranium is increasing throughout the Churchill Province, from Baffin Island to the Nonacho Basin.

SUMMARY OF EXPLORATION

Expenditures on mineral exploration continued to increase, but the total effect on exploration must be adjusted because of inflation which significantly reduced the amounts spent in terms of 1975 dollars. Nevertheless, for the third year in a row there was a significant overall increase in exploration.

Expenditures reported as assessment work on claims and permits total nearly 12 millions, Table I-I, and staking 19,738 claims cost at least two million. As estimates suggest only about one third of the total spent to explore claims is reported for assessment credit, the aggregate expenditures on mineral exploration and development are at least 30 million and possibly as high as 35 million dollars.

TABLE I-I

MINERAL CLAIMS AND REPRESENTATION WORK RECORDED

Year	Claims Recorded	Acreage	Work Recorded
1962	3,922	202,571	395,000
1963	3,507	181,137	1,012,000
1964	5,718	295,335	1,065,000
1965	13,987	722,429	2,022,000
1966	20,200	1,043,330	2,813,000
1967	28,622	1,478,326	2,511,000
1968	44,489	2,297,857	4,811,000
1969	19,083	985,637	4,262,000
1970	14,574	752,747	3,990,000
1971	6,705	346,313	2,781,000
1972	5,555	286,916	2,237,000
1973	15,303	790,400	2,337,000
1974	12,180	629,097	3,192,000
1975	21,049	1,087,181	5,030,000
1976	19,738	1,019,468	11,969,000

in good standing December 31, 1976 64,603 claims, 3,336,745 acres.

Expenditures on Prospecting Permits reached a new high of 3.53 million dollars bringing the total reported spent on the 432 permits issued during the 16 year life of this program to 22.676 millions, (Table I-II). Although there were slightly fewer claims staked than in 1975 assessment work recorded reached a new high of 8.44 millions, a 68% increase over 1975.

TABLE I-II

PROSPECTING PERMITS ACQUIRED AND EXPLORATORY WORK RECORDED ON PROSPECTING PERMITS

Year	Number of Permits			Area of Permits (1000 acres)		Permit Expenditure ($1000)
	New	Lapsed	Total Held	New	Total Held	
1961	28	3	25	4,520	4,520	452
1962	8	14	19	1,371	3,010	465
1963	2	2	19	542	2,527	670
1964	Nil	10	18	1,551	2,552	474
1965	1	12	7	176	1,005	238
1966	8	2	13	1,544	2,048	330
1967	Nil	10	3	Nil	431	84
1968	17	Nil	20	2,677	2,964	666
1969	103	11	112	18,020	18,876	2,998
1970	54	39	127	8,544	12,885	3,114
1971	41	54	114	5,152	7,742	1,747
1972	17	66	65	1,735	3,872	926
1973	19	35	49	3,349	4,657	1,171
1974	39	21	67	7,624	9,122	2,963
1975	18	19	66	3,099	6,786	2,846
1976	68	17	97	11,826	14,455	3,531
Total 61-76	435	315		71,730		22,675

During 1976 exploration was concentrated in and along the fringes of the Slave Province. More than half of the projects representing approximately half of the expenditures in 1976 were conducted in this part of the Mackenzie District (Table I-III) where interest in volcanogenic base metal sulphides continued to predominate. Texasgulf's continued success with the Izok Lake deposit where drill indicated reserves were expanded to 12 million tons kept interest at a high level and many companies probed the northern and central Slave Province greenstone belts. Interest in the uranium potential of the Bear Province was widespread. At least six companies acquired ground along zones parallel to the Bathurst trench. Five companies worked in the East Arm of Great Slave Lake and some 30 projects were underway in the main part of the Bear Province in a broad belt between Rae in the south and Coppermine in the north.

[1]Resident Geologist, DIAND, Yellowknife

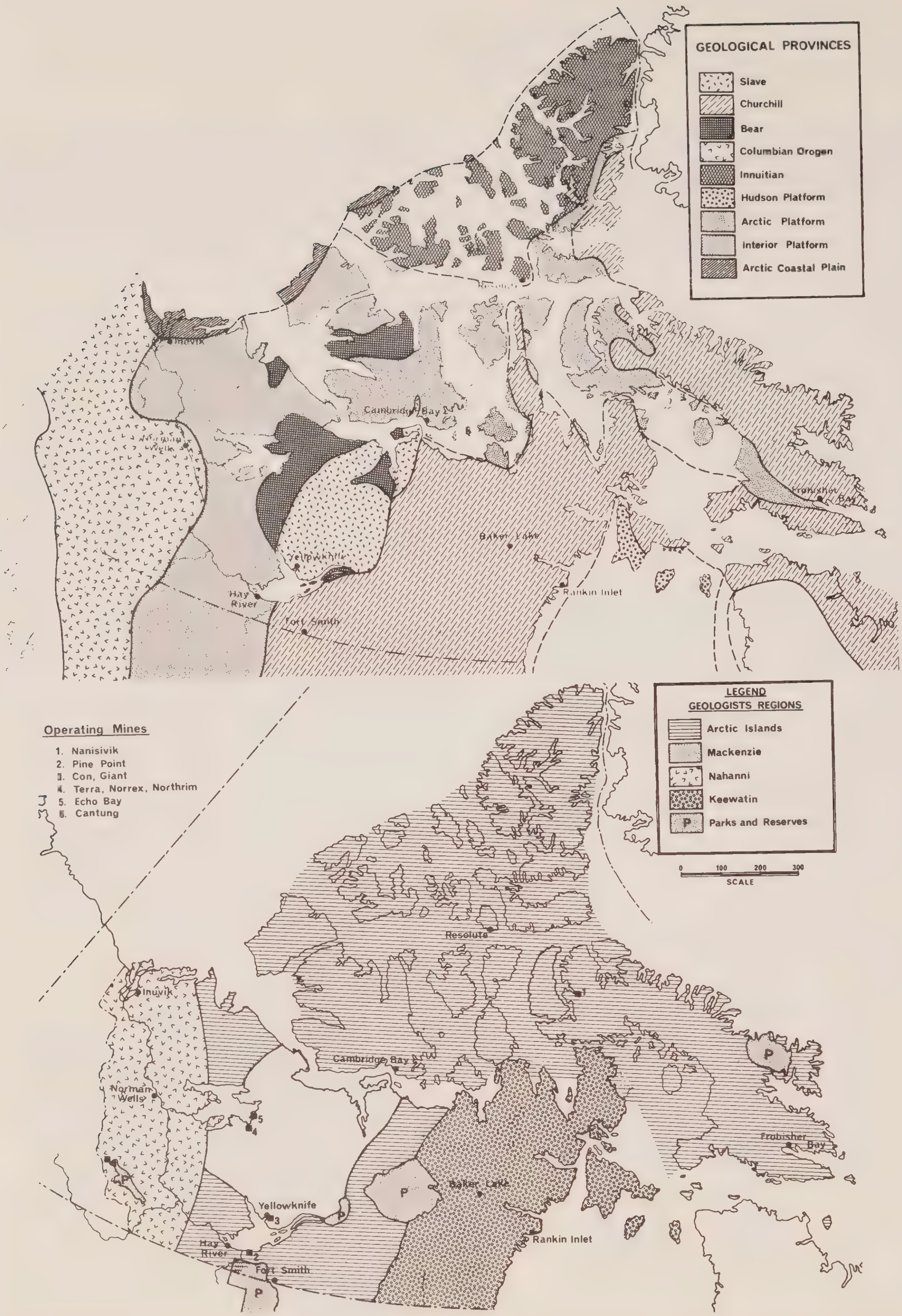


Figure I-1 Regions monitored by Northern Affairs District Geologists. Also shown are Geological Provinces, operating mines and the main population and supply centres in the N.W.T.

TABLE I-III

COMPARISON OF CLAIMS STAKED AND PROSPECTING PERMITS ISSUED IN 1975 AND 1976

MINING DISTRICT	CLAIMS STAKED 1975	1976
Arctic & Hudson Bay	5,315	7,917
Mackenzie	10,370	11,471
Nahanni	5,364	350

REGION	PROSPECTING PERMITS 1975	1976
Arctic Islands	-	7
Bear & Slave Provinces	3	15
Cordilleran Area	3	1
Churchill Province	12	45

The search for uranium in the Bear Province was accompanied by rumours supported by extensive drill projects that suggest a copper-uranium deposit has been found on the SUE-DIANNE Group, a small uranium deposit has been found northwest of Hottah Lake, and a promising uranium find has been made in the Dismal Lakes area 110 km southwesterly from Coppermine.

Base metal exploration continued in the Kaminak Lake area of the Keewatin Region, but by far the largest expenditures in this region were on uranium prospects in the Baker-Thelon region southeast and northeast of the Thelon Game Sanctuary. Targets here are in the Amer and Dubawnt Groups and along the unconformity between the Dubawnt and older Churchill Province rocks.

Base metal exploration continued apace in the Cordillera where Canex Placer and U.S. Steel are exploring the large lead-zinc deposits near Howard's Pass on the Yukon N.W.T. border. Far to the north on the Gayna River, extensive work by Rio Tinto Exploration suggests significant finds of lead-zinc can be expected in this district. Extensive staking along the late Proterozoic copper belt of the central Mackenzie Mountains late in 1975 was followed by extensive drilling by Shell Resources Ltd. Rio Tinto, Canadian Nickel (Canico) and Cominco also explored in the copper belt. In addition at least four properties saw smaller scale drill tests for lead-zinc.

Western Mines Ltd. reported that nearly 3 million tons grading 16% combined lead-zinc has been indicated by drilling on their claims west of Pine Point. Pine Point Mines Ltd. continued aggressive exploration mainly on their mining leases. Shell Resources staked 642 claims at the east end of the Pine Point Mines holdings.

Shifts in new exploration interest are best reflected in the number of claims staked and permits issued. Table I-III gives an overview of these changes. Because more than half of the Cordilleran province is in the Mackenzie District (north of the Canol Road) and because both Arctic and Hudson's Bay and Mackenzie Mining Districts are vast areas representing five or six different geological provinces a breakdown of claims staked in these smaller regions is given in Table I-IV. This table clearly shows the surge of interest in the Pine Point, Dismal Lakes (Bear Province) and Keewatin Districts. Expenditures in the next few years are likely to be concentrated in these areas.

TABLE I-IV

CLAIMS STAKED DURING 1976 IN VARIOUS GEOLOGICAL 'PROVINCES'

Arctic Islands	Nil
Baffin Island (Churchill Province)	41
Keewatin Region (Churchill Province)	10,288
Churchill Province (west of Keewatin)	1,454
Slave Province	2,980
East Arm Subprovince	70
Bear Province	2,156
Pine Point District (Interior Plains)	2,357
Nahanni Region	392
	19,738

SUMMARY OF MINING

Mineral production (Table II-I, page 8) increased 11% in value to 228 million dollars equivalent to $ 5,560 for every person in the Territory. The increased value resulted mainly from a doubling of the amount of silver produced, increases in zinc production which more than offset the decline in lead production and a significant increase in the price of tungsten. Although gold production at Con and Giant Mines increased, the gold price was down sharply.

With the start up at Nanisivik nearly 2,000 people are now employed full time in the mining industry.

A new lead-zinc mine, Nanisivik on Strathcona Sound near the north end of Baffin Island, began production towards the end of 1976. A massive layered sphalerite-galena-pyrite ore, filling a two mile long subterranean river channel will be mined at a rate of 1,500 tons per day to produce 125,000 tons of zinc and 20,000 tons of lead concentrate each year (Gibson, 1978). Ore reserves of nearly seven million tons promise a life of at least 12 years. Production began at the west end of the deposit which is closest to tidewater. The mill is a few hundred feet from the crushing facilities which are installed beneath the west end of the deposit. Concentrates are trucked a short distance to a storage site beside the deep water dock.

With shipping facilities so close at hand, and because of the regularity of the deposit, Nanisivik should be an extremely efficient operation.

Giant Mine increased its throughput to 1,173 tons per day, 40% of this came from open pits. That ore was lower grade than average. Operations in one pit came to an end but three additional smaller pits are being developed. Stringent economy measures were instituted to reduce costs; exploration expenditures were cut and the mine labour force reduced.

Con Mine increased its milled tonnage and improved its grade. Sinking was completed at the Robertson shaft which should be in full operation by mid 1977.

Pine Point Mines treated nearly the same amount of ore as in 1975 but zinc grade was up and lead down resulting in an increase in income. A large (30 yard capacity) dragline to strip flat lying deep ore bodies was ordered. It is to be in operation by 1978.

Echo Bay Mines completed its move to the Eldorado Mine. Results have been encouraging with silver production more than doubled over 1975 and grades averaging a respectable 47 oz/ton Ag. Dewatering to permit entry to lower levels is planned and ventilation is to be improved to combat high radiation levels.

At Terra Mines silver production was doubled to 1.9 million ounces and development began at the Norex property seven road miles to the east. Ore reserves at year end were minimal, a common situation in the high grade silver deposits of the Camsell River Silver District.

Northrim Mines operated their underground mill at the Silver Bay Mine across the Camsell River from Norex for a few weeks towards the end of the year. Concentrates were reported shipped out on the winter road but grades of ore and concentrate and the amount of silver produced are not available.

Cantung Mine improved its performance during the year as they gained more experience milling the ore from the new underground operation. High Tungsten prices, 50% higher than those of 1975, improved profits. Plans for mill expansion to 1,000 tons per day with commensurate expansion in the townsite and other facilities were announced. The underground mine appears to be extremely efficient with a high output per man day.

ACTIVITIES OF THE NON-RENEWABLE RESOURCES SECTION, INDIAN AND NORTHERN AFFAIRS, 1976

The Department of Indian and Northern Affairs administers the non-renewable resources of the N.W.T. The Non-Renewable Resources Section in Yellowknife comprises four units; the offices of the Regional Oil and Gas Conservation Engineer, the Regional Mining Engineer, the Resident Geologist, and the Mining Recorder.

Since early 1976 all mining recording activities, with the exception of the supervision of Prospecting Permits have been concentrated in Yellowknife. Offices of the Mackenzie Mining District (E.D. Cook Mining Recorder), and Nahanni and Arctic and Hudson Bay Mining Districts (J.B. Black Mining Recorder), operate under Supervising Mining Recorder, R.L. Williams. The Oil and Gas section with a staff of 15 under the supervision of Regional Oil and Gas conservation Engineer M.D. Thomas, P.Eng., monitors oil and gas exploration and production. Mining Inspection Services, with a staff of 10, monitors mine safety, operates the Federal Assay Laboratory and the Mine Rescue station. It is supervised by Regional Mining Engineer, M.L. Brown, P.Eng.

The Mining Geology section with a staff of 10 monitors mineral exploration, technical assessment submissions, provides geological expertise and advice to prospectors, geologists, the general public and departmental personnel, conducts detailed mapping in rocks favourable for mineral discoveries, assists university research projects and provides an expiditing service for various other Government and University financed field operations mainly out of Yellowknife.

During 1976 the Geological Section continued mapping in the North Belt, the northern extension of the Yellowknife volcanic belt, and mapped 86 I/1 and I/2 east of Takijuq Lake (Hyde *et al.*, 1978), both containing volcanic formations favourable for mineral deposit exploration.

In the Keewatin District P.J. Laporte supervised mapping in the Baker Lake, Heninga Lake and Ferguson Lake areas by Sid Leggett and K. Barrett of the University of Manitoba.

C.W. Jefferson began stratigraphic sedimentologic and economic studies of the copper bearing formations in the Mackenzie Mountains and F. Krause of the University of Calgary continued similar studies of the Sekwi Formation. At the University of Alberta P.J. English began a geochemical investigation of the graywacke hosted gold-quartz veins in the Yellowknife sedimentary basin and S. Goff continued studies of the volcanic formations in the East Arm subprovince. Logistical support was provided to G. Yeo of the University of Western Ontario who investigated the Rapitan iron formation and to J.P. Sorbara University of Toronto who studied iron formations in the Back River area of the Slave Province.

Mr. T. Tan, University of Calgary, was provided with a transportation grant to assist his study of late Triassic to lower Cretaceous dinoflagellates from Mackenzie King and Melville Islands.

A considerable number of open file geological reports have been prepared for distribution through the Resident Geologist's Office. Although many have been superceded by later work, or may be out of date by now, some readers may be unaware of their existence and therefore they are listed below.

Officers of the Geology section gave papers at meetings in Thunder Bay, Edmonton, Boulder Colorado, Sydney, Australia, and presented summaries of exploration and reports on research at the Geoscience Forums in Yellowknife and Whitehorse. Titles of these papers include:

Gibbins, Walter, A., Iyerak, Joe; Geological Education in Arctic Canada 1976 Annual meeting, Geological Society America, Boulder, Colorado.
Gibbins, Walter, A.; Carbonate hosted lead-zinc deposits of the Northwest Territories, First Annual CIM District 4 meeting, Thunder Bay.

The following papers were presented at the Geological Association of Canada annual meeting in Edmonton in May, 1976:
Jefferson, C.W., Young, G.M., Stromatolites of the Upper Proterozoic Shaler Group, Banks and Victoria Islands, N.W.T.
Laporte, P.J., Geology and Geochemistry of the Rankin Inlet Group, Rankin Inlet, N.W.T.
Padgham, W.A., The Hackett River Volcanic Belt, Mackenzie District, N.W.T.

Padgham also presented a paper titled Mineralization in the Slave Province, its relation to volcanic belts

and continental evolution in section 4A, Genesis of Stratiform ore deposits at the 25th International Geological Congress, Sydney, Australia.

FORMAT AND ACKNOWLEDGEMENTS

There are eleven chapters in this report. The author of each section is given on the first page and in the table of contents. Reference to this report should be made to the author of the individual section of interest as in: Laporte, P.J., Mineral Industry Report 1976, Northwest Territories, Chapter IV, The Keewatin Region. EGS 1978-11

Most sections were written totally by one person but the Mackenzie Region Report, Chapters VI and VII, which contains nearly half of the total descriptions has extensive input from Staff Geologist E.H. Hurdle. Editing has been the responsibility of C. Lord and W.A. Padgham. Most of the drafting is by Mr. A. Dusseault and Mrs. K. Bannister of the IAND Drafting Section, Yellowknife.

Minor variations in organization from region to region will be apparent in this report. This has been allowed in order to facilitate production of a report that would best fulfill the needs of the region as recognized by the District Geologist involved.

The title or introductory section gives the name of the group, company or persons doing the work. If this is not the claim owner, that may be noted in *HISTORY* or in some cases, where the change was made in 1976, in *CURRENT WORK*. Essentially the report deals with the report done under the name of the persons or company that did or contracted for the work. Location, when convenient, is given by National Topographic Sheet (NTS) number, by latitude and longitude and under location by reference to local topography and distance from a major centre. As most names in use have not been approved by the Canadian Permanent Committee on Geographical Names we have not attempted to differentiate these in any way.

REFERENCES are given to the most current regional and detailed published geological maps and reports. Properties have been grouped in districts where locations, histories, references and geological situation are similar, and thus some general references appropriate to various properties will be given only in the description of the district.

HISTORY describes the past work on the claim, or earlier staking of the ground where this is known. The *DESCRIPTION* gives the local and, in some cases, regional geology and the economic geology of showings or deposits if known from non-confidential sources.

CURRENT WORK AND RESULTS deals with 1976 work on various claims and permits but in some cases regional reconnaissance has not been directly connected with mining properties, so no property can be listed. Because in many cases current work has been verified by reference to assessment work records which may not be open to public scrutiny until late 1979, or in some cases 1981, all write-ups have been submitted to the companies who did the work to be sure that disclosures of confidential data would not occur.

LIST OF PUBLICATIONS ON THE N.W.T. AS OF JANUARY, 1978 BY EXPLORATION AND GEOLOGICAL SERVICES UNIT, D.I.A.N.D.

Mineral Industry Reports

Mineral Industry Report, 1969-70, Vol. 2, Northwest Territories, east of 104° west longitude; by P.J. Laporte, 1974 $ 2.00

Mineral Industry Report, 1971-72, Vol. 2, Northwest Territories, east of 104° west longitude; by P.J. Laporte, 1974 $ 2.50

EGS 1975-8 Mineral Industry Report, 1971-72, Vol. 3, Northwest Territories, west of 104° west longitude; by W.A. Padgham, M.M. Kennedy, C.W. Jefferson, D.R. Hughes and J.D. Murphy. $ 3.00

EGS 1976-9 Mineral Industry Report, 1973, Northwest Territories; by W.A. Padgham, J.B. Seaton, P.J. Laporte and J.D. Murphy. $ 3.75

EGS 1977-5 Mineral Industry Report, 1974, by W.A. Gibbins, J.B. Seaton, P.J. Laporte, J.D. Murphy, E.J. Hurdle, W.A. Padgham. $ 4.50

EGS 1978-5 Mineral Industry Report, 1975, Northwest Territories. P.J. Laporte editor. $ 6.00

EGS 1978-6 Mineral Industry Report, 1969-70, Vol. 3, Northwest Territories, west of 104° longitude. Theresa Padgham editor. No Change

Geological Maps and Reports

Preliminary geology map of Camsell River Silver District, scale five inches to one mile; by R.J. Shegelski and J.D. Murphy; G.S.C. Open File 135, 1973. $ 3.50

Preliminary geology map of Rainy Lake, N.W.T., 86 E/9, scale 1:31,680; by J.D. Murphy; G.S.C. Open File 135, 1973. $ 2.00

Preliminary geology map of Rankin Inlet, 55 K/16, scale 1:31,680; by P.J. Laporte and S.K. Frape; G.S.C. Open File 179, 1973. $ 2.00

Preliminary geology map of White Eagle Falls, N.W.T., 86 F/12, scale 1:31,680; by W.A. Padgham; G.S.C. Open File 199, 1974. $ 2.00

Preliminary geology map of High Lake, N.W.T., 76 M/7, scale 1:31,680; by W.A. Padgham; G.S.C. Open File 208, 1974. $ 2.00

Geology of Two Base-Metal Deposits (High Lake and Indian Mountain deposits) in the Slave Structural Province; by W.Johnson; G.S.C. Open File 239, 1974. $ 4.00

Lake-sediment geochemical sampling survey in the following areas: Yellowknife, Indin Lake and portions of the Cameron River and Beaulieu River, Greenstones Belts. Consists of: report and 14 maps showing sample locations and values, regional geology and mineralized localities; by D. Nickerson; G.S.C. Open File 129, 1972. $12.00

EGS 1975-1, 1975-2, 1975-3 Preliminary geology maps of Hackett River, 76 G/13, G/12, G/5 (part) scale 1:31,680; by W.A. Padgham, M.P.D. Bryan, C. Jefferson, E.A. Ronayne and V.Z. Sterenberg. $ 2.00/map

EGS 1976-4, 1976-5, 1976-6, 1976-7, 1976-8 Five preliminary geology maps of Hackett River, 76 K/2, F/9, K/1, F/15, F/16, scale 1:31,680; by C.W. Jefferson, W.A. Padgham, M.P.D. Bryan, R.J. Shegelski, E.A. Ronayne, H. Vandor and L. Thorstad. $ 2.00/map

EGS 1976-1 Preliminary geology map of Heninga Lake, 65 H/16, scale 1:31,680; by K.R. Barrett and S.R. Leggett. $ 2.00

EGS 1976-2 Preliminary geology map of Ferguson Lake, 65 I/15, scale 1:31,680; by K.R. Barrett, P.J. Laporte and S.R. Leggett. $ 2.00

EGS 1976-3 Preliminary geology report of Baker Lake, 56 D/2 (part), D/7 (part), includes surficial and bedrock geology maps, scales 1:15,840 and 1:1,000; by K.R. Barrett, P.J. Laporte and S.R. Leggett. $ 2.00

EGS 1976-17, 1976-18 Preliminary geology maps of Takijuq Lake, 86 I/1 and 86 I/2, scale 1:31,680; by R.S. Hyde, H.A. McLeod, B.T. Scribbins and S. Taylor. $ 2.00

EGS 1978-1 Preliminary geology map of Amer Lake, 66 H/7, scale 1:31,680; by P.J. Laporte, K.R. Barrett and G. Schwab.

EGS 1978-2 1977 Exploration Activity in the Keewatin District. One index map and eight maps outlining the geology and property ownership in seven active areas of the Keewatin. Prepared by P.J. Laporte for presentation at the December 8, 1977 Geoscience Forum in Yellowknife.

EGS 1978-4 Preliminary geological maps of NTS 86 H/14, 15 and 16, scale 1:31,680; by A.F.S. Bau, L. Aspler and E. Hurdle.

EGS 1978-7 Preliminary geological map of the Echo Bay region, mapped at a scale of 1:21,500; by D.S. Hildebrand. $ 1.00

EGS 1978-8 Surficial Geology Permafrost and Related Engineering Problems, Yellowknife, N.W.T. L.B. Aspler. (This report released July, 1978 has been included in this mineral industry report as Chapter IX.

In Preparation

Copies of these manuscripts can be examined at the Resident Geologist's Office, Yellowknife

Geological compilation of Beniah Lake, 85 P/8, scale 1:31,680.

Preliminary geology map of Turquetil Lake, 55/13 and Carr Lake, 55 L/4, scale 1:31,680. An updated and revised edition of EGS 1976-1, geology map of Heninga Lake 65 H/16, scale 1:31,680; compiled by P.J. Laporte.

Geological maps of 86 H/9, H/10, H/11, scale 1:31,680.

Geological maps of the Northern part of the Yellowknife volcanic belt, approximate scale 1" = 600 feet.

Miscellaneous Studies

The following preliminary reports are on open file at the Resident Geologist's Office in Yellowknife, N.W.T. and Whitehorse, Y.T.

The Geochemistry of Lake Sediments in the Yellowknife River Area, N.W.T.: by Robert G. Jackson, Department of Geological Science, Queen's University, May, 1973. $ 6.00

Coal Deposits in the Arctic Archipelago, N.W.T., by T.W. Caine, 1973. $ 2.00

Coal Occurrences of the Western Mainland of the Northwest Territories, by J.A. Goodwin. $ 2.00

Soapstone Deposits of the N.W.T.; by J.D. Murphy, 1973. $ 5.00

Mineral occurrence overlays for geological maps of various parts of the N.W.T. show most mineral showings reported for the various areas. These sheets are updated at irregular intervals. Costs are $ 1.00/sheet paper and $ 2.50/sheet transparent mylar.

As of January, 1978 sheets are available for most of NTS 75, 76, 85, 86 and parts of 77, 87, 95, 96, 105 and 106.

Papers

Copies of the following papers are available free of charge from the Resident Geologist's Office in Yellowknife.

Exploration for Lead-Zinc in the Selwyn and Mackenzie Mountains, Yukon and Northwest Territories; by J.D. Murphy and W.D. Sinclair. Paper presented at the Prospectors and Developers Association Convention, Toronto, Ontario, 1974.

Mineral Potential of the Northwest Territories; by W.A. Padgham. Published in the Geology of Canadian Arctic. Editors: J.D. Aitken and D.J. Glass. Special publication of the C.S.P.G. and G.A.C., 1974.

Lead-Zinc Mineralization in the Central Dolomite Belt of the Lower Cambrian Sekwi Formation; by W.J. Crawford. Paper presented at Geoscience Forum, Yellowknife, N.W.T., 1974.

Lake Sediment Geochemistry as a Guide to Detection of Massive Sulphide Deposits in the Southern Slave Province; by R. Jackson and I. Nichol. Paper presented at Geoscience Forum, Yellowknife, N.W.T., 1974.

Highlights of Mining Exploration in the Northwest Territories, 1974; by R.W. Hornal. Paper presented to Prospectors and Developers Convention, March, 1975.

Preliminary Summary of Mineral Exploration in the Northwest Territories, 1975; by the staff of the Resident Geologist's Office, D.I.A.N.D., Yellowknife, N.W.T.

Preliminary Summary of Mineral Exploration in the Northwest Territories, 1976; by the staff of the Resident Geologist's Office, D.I.A.N.D., Yellowknife, N.W.T.

Exploration Overview Northwest Territories, 1977; by staff of the Resident Geologist's Office, D.I.A.N.D., Yellowknife, N.W.T.

Reports

Available only from:

> Exploration and Geological Services Unit,
> Northern Natural Resources and Environment Branch,
> D.I.A.N.D.,
> Ottawa, Ontario, K1A 0H4.

Mines and Mineral Statistics, North of 60 (published monthly and includes claim staking and production statistics for Yukon and Northwest Territories).

Mines and Minerals Activities, North of 60 (published yearly and includes summaries of exploration and mining activities for Yukon and Northwest Territories).

OPERATING MINES

E.J. Hurdle[1]

D.I.A.N.D., Geology Office, Yellowknife, N.W.T.

INTRODUCTION

In 1976 eight mines (Fig. I-1, p.2), Con, Giant, Pine Point, Terra, Echo Bay, Northrim, Cantung and Nanisivik, operated in the Northwest Territories, Northrim and Nanisivik having started in October. Giant Yellowknife Mines Limited and Pine Point Mines Limited worked both open pits and underground.

Giant, Con, Echo Bay, Terra and Northrim Mines produce mainly precious metals from shear-zone and vein deposits in Precambrian volcanic rocks of the Slave and Bear Provinces. Cantung Mine extracts tungsten and copper from skarns developed in Cambrian carbonates during the intrusion of a quartz monzonite in the Cretaceous. Pine Point and Nanisivik Mines produce lead, zinc and cadmium from stratabound ore-bodies in Paleozoic and Proterozoic carbonates respectively.

Production from the seven mines which reported in 1976 is summarized in Table II-1 below. Reserves are given in Table II-2 for 6 mines, Echo Bay and Northrim had no proven reserves in 1976 and Terra Mine had none the previous year. This is typical of the erratic nature of the high grade silver deposits in the Great Lake area.

TABLE II-1: PRODUCTION FIGURES FOR OPERATING MINES IN THE NORTHWEST TERRITORIES, 1976

COMPANY	PINE POINT MINES LTD.	CANADA TUNGSTEN MINING CORP.	ECHO BAY MINES LIMITED	TERRA MINING & EXPLORATION CO.	NANISIVIK MINES LIMITED	GIANT YK MINES LTD.	CON MINE (COMINCO)
TYPE OF OPERATION	Open pit & underground	Underground	Underground	Underground	Underground	Underground & open pit	Underground
LOCATION	Pine Point	Tungsten	Great Bear Lake	Rainy Lake	Strathcona Sound	Yellowknife	Yellowknife
RATE, TONS PER DAY	10,340	516	108	126	1,421	1,173	413
GRADE	1.7% Pb 5.3% Zn	1.55% WO_3	1.1% Cu 47.2 oz/ton Ag	43.5 oz/ton Ag	14% Zn 1.5% Pb 1.8 oz/ton Ag	0.281 oz/ton Au	0.62 oz/ton Au
TOTAL TONS MILLED	3,773,000	188,934	39,387	46,090	68,339	428,154	151,000
PRODUCTION	121.25 m.lb Pb 377.94 m.lb Zn	4.78 m.lbs WO_3	1.866 m.oz/Ag 879,000 lbs Cu	1.9 m.oz Ag 142,176 lbs Cu	12.05 m.lbs Zn 690,046 lb Pb 52,196 lb Cd	106,714 oz Au 25,157 oz Ag	90,300 oz Au
EMPLOYEES	685	156	115	53		346	236

TABLE II-2: ORE RESERVES, 1976

Reserves (year end) th. tons	Pine Point Mines Ltd.	Canada Tungsten Mining Corp.	Terra Mining & Exploration	Nanisivik Mines Ltd.	Giant YK Mines Ltd.	Con Mine (Cominco)
1977	37,500	4,200	N/A	6,353	1,004	-
1976	36,200	4,190	N/A	6,324	1,505	1,470
1975	39,200	4,437	12.5	6,970	1,950	1,670
Reserve Grade (year end)						
1976	2.0% Pb 5.4% Zn	1.55% WO_3	N/A	14.12% Zn 1.4% Pb 1.8 oz/ton Ag	0.34 oz/ton Au	0.53 oz/ton Au
1975	2.0% Pb 5.4% Zn	1.60% WO_3	62 oz/ton Ag		0.33 oz/ton Au	0.58 oz/ton Au

[1]Staff Geologist, D.I.A.N.D.

NANISIVIK MINE
Nanisivik Mines Ltd.,
Suite 100, 330-5th Av. SW,
Calgary, Alberta.
T2P 0L4

Lead, Zinc
48 C/1
73° 02'N, 84° 30'W

REFERENCES

Blackadar (1956, 1970); Blackadar *et al.*, (1968 b); Clayton (1966); Geldsetzer (1973a, 1973b); Lemon and Blackadar (1963); Trettin (1969).

PROPERTY

Six leases and seven claim groups illustrated in Fig. II-1.

LOCATION

The property is on the south shore of Strathcona Sound, a fiord on the north end of Baffin Island. The deposit is immediately west of Kuhulu Lake and 27 kilometres (17 miles) each of the settlement of Arctic Bay.

HISTORY

A. English, a prospector with the Dominion Government Expedition (1910-1911) to the Arctic Islands under the direction of Captain J.E. Bernier, discovered pyrite with minor sphalerite and galena on the south side of Strathcona Sound. J.F. Tibbet and F. McInnes, two prospectors, travelled from Churchill by dog team in 1937 and staked two claims on a pyrite showing near the western end of the Strathcona Sound deposit. They had very little time to work and their claims lapsed the following year.

The area was mapped and some of the pyrite showings visited in 1954 (Blackadar, 1956). Geologists from Texas Gulf Sulfur staked several claims in 1957. Detailed geological and geophysical surveys and trenching tested the showings in 1958. Between 1961 and 1965 over 85,000 feet (25,908 metres) of drilling outlined the ore body and tested several other showings. Geological surveys and 2,000 line feet (610 line metres) of geophysical surveys were done between 1966 and 1967. In 1969 an adit and four cross-cuts explored the east end of the main orebody, and in 1970, a 50-ton sample was taken for metallurgical testing.

In 1972 Mineral Resources International Ltd. agreed to bring the Strathcona Sound deposit to production whereby they would acquire a 65% interest in the property. The firm of Watts, Griffis and McOuat was engaged to prepare a feasibility study. The west end of the deposit was drilled and bulk sampled and the GULL claims were staked in late 1972. A feasibility study and additional geological, geophysical and geochemical surveys were completed and heavy equipment was delivered by sea-lift in 1973. A new company, Nanisivik Mines Ltd., formed in 1974 to operate the mine, is owned 59.5% by Mineral Resources International, 18% by the Government of Canada, 11.25% by Metallgesellschaft Canada Ltd. and 11.25% by Biliton B.V. In 1974 Strathcona Mineral Services Limited was contracted to manage the project.

Between August, 1974 and March, 1975 two adits and a connecting ramp were excavated at the western end of the ore body. The upper level is the mining horizon and follows the top of the ore zone; the lower adit is the main service drift to the crushing, screening and storage facilities.

DESCRIPTION

The regional geology of the Strathcona Sound-Arctic Bay area has been discussed in several papers and is shown on Map 1237A, Arctic Bay-Cape Clarence (Blackadar *et al.*, 1968c).

The stratigraphy and lithology of the area are given in Table II-3. Preservation and present distribution of Proterozoic rocks is controlled by a major northwesterly trending 25 km (16 mile) wide graben that extends across the Borden Peninsula. Within this system the Proterozoic sediments have been down-dropped, folded and faulted into a series of smaller horsts and grabens and intruded by a distinctive parallel trending gabbro dyke swarm. The sediments strike perpendicular to the graben system.

TABLE II-3:

STRATIGRAPHIC SEQUENCE - STRATHCONA SOUND, NORTH BAFFIN ISLAND
(after Lemon and Blackadar, 1963)

Period	Group	Formation	Thickness Feet Metres in Italics	Lithology
Quaternary				Silts, gravels, clays
		Unconformity		
PALEOZOIC Cambrian-Ordovician	ADMIRALTY GROUP +2580, *+ 790*	Baillarge	+ 460 *+ 140*	Limestone, fossiliferous
		Ship Point	920 *240*	Flaggy dolomite, fossiliferous
		Turner Cliffs	± 350 *± 110*	Sandstone, siltstone, mudstone, shale
		Gallery	± 600 *± 180*	Sandstone
		Angular unconformity		
				Gabbro dykes
		Intrusive contact		
PROTEROZOIC Helikian	ULUKSAN GROUP 6850 (2090)	Elwin	±2500 *± 760*	Sandstone, siltstone, shale
		Strathcona Sound	±2500 *± 760*	Mudstone, siltstone
		Victor Bay	+ 600 *+ 180*	Dolomite, minor limestone, mudstone, edgewise conglomerate
		Society Cliffs	+ 900 *+ 275*	Dolomite, solution breccia and conglomerate, algal laminae
		Arctic Bay	+ 350 *+ 110*	Calcareous shale
		Disconformity		
	EQALULIK GROUP	Adams Sound	+4000 *+1220*	Quartzite, minor shale, conglomerate
		Nauyat q	±1000 *± 305*	Andesite and basalt flows, tuffs
		Lower Quartzite	± 50 *± 15*	Quartzite
Aphebian		Angular unconformity		
				Biotite gneiss, granitoid gneiss

The Society Cliffs dolomite, which underlies most of the Nanisivik property and much of the graben, contains the orebody and in the vicinity of the deposit

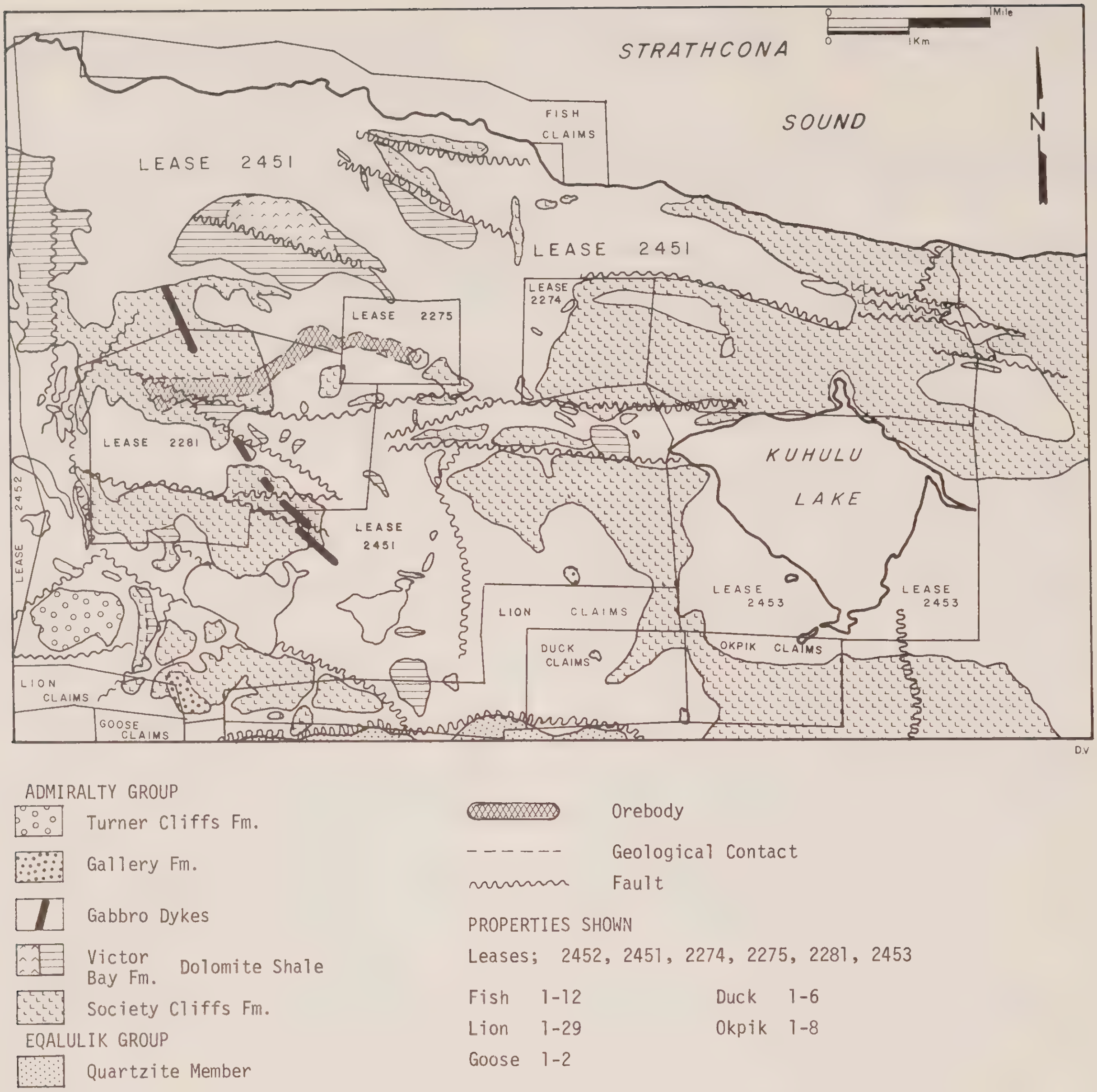


Figure II-1: Nanisivik Mine: Property and geology map (geology from Watts, Griffis and McQuat, 1975)

is typically a medium to dark brown laminated algal dolomite. Solution breccia, flat pebble conglomerate, vugs, petroliferous odor and stain, carbonaceous matter, and narrow veinlets of recrystallized carbonate are common.

Geldsetzer (1973a, 1973b) has shown that dolomitization, solution and collapse brecciation, karsting, mineralization and cementation of the breccias took place in a short time interval, between deposition of the Society Cliffs and Victor Bay Formations. Furthermore, uplift and erosion, depth and degree of karsting and brecciation of the Society Cliffs Formation increase in a westerly direction.

The sulphide ore body is flat-lying, trends east-west for 10,000 feet (3,048 metres) and has an open shape similar to a gentle river meander. In cross-section it is a horizontal lens 200 to 400 feet (61 to 122 metres) wide and up to 60 feet (18.29 metres) thick in the centre. Sphalerite and galena are the most important ore minerals and pyrite the major gangue mineral. Sphalerite is generally coarse grained and varies in colour from light buff to dark brown, mostly due to an iron content varying from 0.25 to 11.5 weight per cent. Variable amounts of cadmium and silver, minor amounts of dolomite, calcite, quartz, pyrrhotite and chalcopyrite are present in the ore zone. The cadmium and silver are associated with the sphalerite. Much of the ore has roughly horizontal 0.5 to 2 cm (0.2 to 0.8 inches) thick sphalerite layers alternating with sparry carbonate and/or pyrite layers. The sulphide ore body usually has a very sharp and well-defined contact with the barren dolomite. Commonly an envelope of massive pyrite separates the lead-zinc ore from the dolomite. Sulphides are

rarely found above the ore body but deep drilling commonly intersects a vertical keel of pyrite and smaller horizontal wings of lead-zinc mineralization. Solution and collapse breccias seem to be less common in the immediate vicinity of the ore.

The Watts, Griffis and McOuat Limited feasibility report concluded that the Strathcona Sound orebody contains 6,970,000 tons averaging 14.1% Zn, 1.4% Pb and 1.8 oz/ton Ag, based on a cutoff grade equivalent to 7% zinc (Mineral Resources International Annual Report, 1974).

CURRENT WORK AND RESULTS

By the end of September, 1976, Nanisivik Mines had installed the equipment for a concentrator, central power plant and underground crushing plant. Production began on September 30, 1976 at 1,421 tonnes per day and by the end of December, 313 tonnes of lead concentrate and 5,464 tonnes of zinc concentrate containing 23,676 kg of cadmium and 3,170 kg of silver had been produced from 68,339 tonnes of ore. A fire in December destroyed two air compressors reducing production slightly.

PINE POINT MINES
Pine Point Mines Ltd.,
Pine Point, N.W.T.

Lead, Zinc
85 B/10, 15, 16
60° 50'N, 114° 25'W

REFERENCES

Bell (1902); Campbell (1957, 1966, 1967); Douglas and Norris (1974); Jackson and Beales (1967); Jackson and Folinsbee (1969); Lord (1951); McGlynn (1971); Norris (1965); Patterson (1975); Skall (1975).

PROPERTY

4,326 claims

LOCATION

The claims form a block 53 kilometres (33 miles) long and several miles wide on the south shore of Great Slave Lake, 177 kilometres (110 miles) south of Yellowknife (Fig. I-1, II-2). A 97 kilometre (60 mile) highway connects Pine Point with Hay River and there is a 1,370 metre gravel airstrip near the mill. A spur line of the Great Slave Railway provides concentrate and freight transport. The location of important ore deposits are given in Figure II-2.

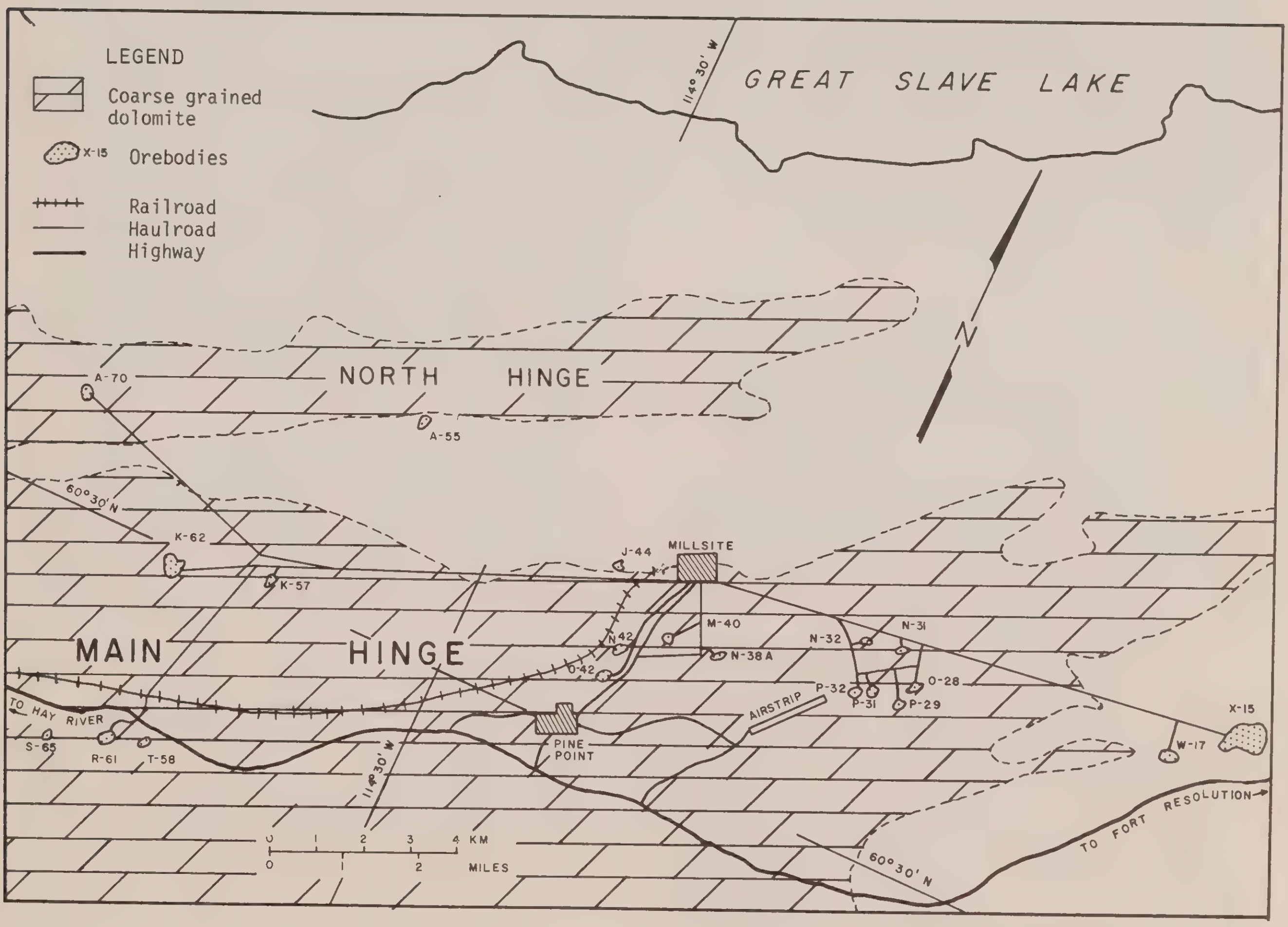


Figure II-2: Pine Point Mines - plan of operations showing the various pits and orebodies

HISTORY

First reports of the lead-zinc showings at Pine Point were published by R. Bell (1902). Apparently, the showings were found by Indians in the area and in 1897 several claims were staked by prospectors. In 1929 Northern Lead Zinc Company was formed with financing from Ventures Limited and Consolidated Mining and Smelting.

A three-year concession of exclusive prospecting rights for a 1,295 square kilometre (500 square mile) area was granted to these companies in 1948. When the concession expired in 1951, more than 1,000 claims were staked and a new company, Pine Point Mines Ltd., incorporated. By 1955, 54,864 metres (180,000 feet) of drilling had outlined 5 million tons with grades averaging 4% Pb and 7% Zn.

The Great Slave Railroad was completed and the first high grade ore shipped in November, 1964. A 5,000 ton per day concentrator completed in 1965 was expanded to 10,000 tons per day in 1969.

Pine Point Mines Ltd. increased their ore reserves by exploration which included more than 300,000 metres (one million feet) of diamond drilling. In addition they purchased the X-15 and W-17 deposits from the Pyramid Mining Co. in 1966, the R-61 and S-65 deposits from Coronet Mines Ltd. in 1972, the A-55 (408) deposit from Conwest Exploration Ltd. and Newconex Canadian Exploration Ltd. in 1974. The T-58 zone was found on the Coronet property in 1975.

DESCRIPTION

The Pine Point area is underlain by several hundred feet of gently southwest dipping Middle Devonian limestone, dolomite and shale (Figs. II-3 and II-4) (Norris, 1965, Douglas and Norris, 1974 and Skall, 1975). Within this sequence, the Pine Point barrier reef complex occupies a key position between evaporites in the south and shales in the north (Skall, 1975).

In pre-Amco shale time, extensive karsting and normal faulting took place parallel to the trend of the reef complex. These faults are the hinge zones along which formed the coarse grained dolomite of the Presqu'ile or K Facies, the host rock for much of the lead-zinc mineralization.

Some 40 orebodies ranging in size from 0.25 to over 15 million tons have been discovered. These may be tabular, stratabound and bedded, apparently controlled by porosity variations in the reefal complex, or pipe-like and prismatic when developed in solution collapse structures. Bedded ore is common on the fringes of the solution collapse orebodies.

According to Patterson (1975) colloform textures exhibited by sphalerite represent rapid precipitation and accumulation of very fine crystals, rather than precipitation from a colloidal gel. Abundant skeletal and radiating galena crystals are believed to represent contemporaneous deposition. Other reniform textures represent sulphide speleothem including cave corals and stalactites.

Campbell (1966, 1967) believed that movement of

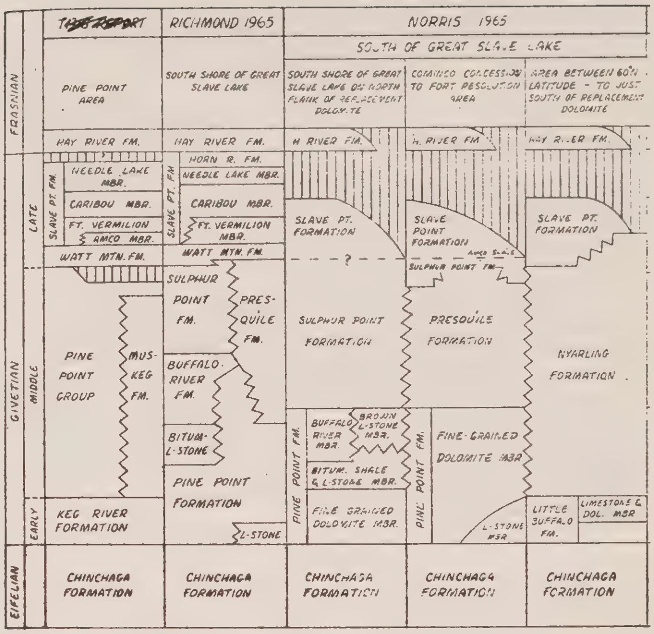


Figure II-3: Nomenclature of stratigraphic units on the south shore of Great Slave Lake (Skall, 1975)

ore fluids, of magmatic origin, was controlled by large faults in the basement. Jackson and Beales (1967) contend that the reef formed on the fault scarp, and the mineralization and dolomitization have no direct relationship with faulting. They proposed that the sulphides formed as a result of mixing of a hypersaline brine carrying lead and zinc as chloride complexes from adjacent basinal shaly sediments with hydrogen-sulphide bearing waters from the back reef carbonate-evaporite complex.

CURRENT WORK AND RESULTS

Six pits were in production in 1976. One of these was 'worked out' during the year. Overburden was stripped from three orebodies to prepare them for production which began from one at the end of the year. Diamond drilling outlined additional tonnage around ore bodies. Reserves at year-end were 36.2 million tons averaging 2.0% Pb and 5.4% Zn.

PRODUCTION DATA: PINE POINT MINES

Year	Tons Milled Daily	Tons Milled in Year	Grade %Pb	Grade %Zn	Production Pb. lbs.	Production Zn. lbs.	Average Payroll
1975	10,840	3.905	2.4	4.9	173,100,000	351,900,000	649
1976	10,340	3.773	1.7	5.3	121,250,000	377,940,000	685

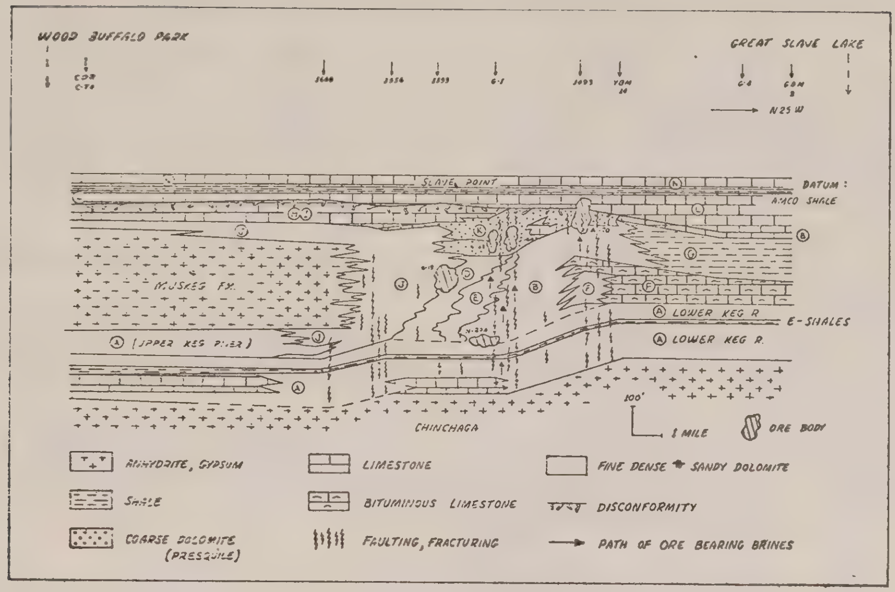


Figure II-4: Composite geologic cross section of the Pine Point barrier complex showing various facies of the Pine Point Group (from Skall, 1975).

CON MINE: CON-RYCON PROPERTY
Cominco Ltd.,
Yellowknife, N.W.T.

Gold, Silver
85 J/8
62°27'N, 114°22'W

REFERENCES
Baragar (1962); Baragar and Hornbrook (1963); Boyle (1961); Campbell (1947, 1949); Henderson and Brown (1966); Henderson (1970, 1976); Jones (1977); Lauer (1957); Lord (1951); McGlynn (1971); Padgham, Kennedy *et al* (1975); Sproule (1952); Thorpe (1966, 1972).

PROPERTY
CON 1-14; KAMEX MEG P & G 1-4; ROSE 1 & 2, STAR SOL

LOCATION
The Con-Rycon property is 0.8 kilometres (0.5 miles) south of Yellowknife, on the west side of Yellowknife Bay (Figs. I-1, II-5).

HISTORY
The CON claims were staked in 1935 for Cominco Ltd. The CON shaft was collared in 1937 and a 100-ton per day mill was put into operation in 1938. The mill capacity increased to 350 tons per day in 1942.

The P & G claims were staked in 1936 and Rycon Mines Ltd. was incorporated to explore and develop them. The Rycon shaft was collared in 1938 and crosscuts on the 500 and 950-foot levels were extended easterly from the Con shaft to connect with the Rycon workings. In 1939 the first Rycon ore was received at the Con Mill.

The Negus Mine opened in 1939 with a 50 ton per day mill and was shut down in 1951. Its shafts are now being used to ventilate the Con Mine.

In 1944 the Campbell system of ore-bearing shear zones was discovered and in 1948 was intersected by a crosscut from the Con Mine's 2,300-foot level. Production began in 1956. The 5,429-foot (1,655-metre) Robertson Shaft was collared in 1973 to facilitate production from the deeper levels.

Between 1939 and 1975 approximately 3,000,000 ounces of gold and 1,000,000 ounces of silver were produced from 5,000,000 tons of ore.

DESCRIPTION
The country rocks are Archean metabasalts and meta-andesites of the Kam Formation intruded by a swarm of westerly dipping gabbroic dykes. Mineralized shear zones cut both the volcanics and gabbro dykes and are in turn cut by diabase dykes and younger faults (Fig. II-5). Two gold-bearing shear zones, the Con and the Campbell, have been developed in the Con Mine.

The Con shear zone, which has an average strike of 020° and dip of 60°W, varies from 10 to 250 feet (3 to 76 metres) in width and has been traced on the surface for 5 miles (8 kilometres). The Campbell shear zone strikes 020° and dips 50°W and lies about 3,000 feet (914 metres) east of the Con system. It

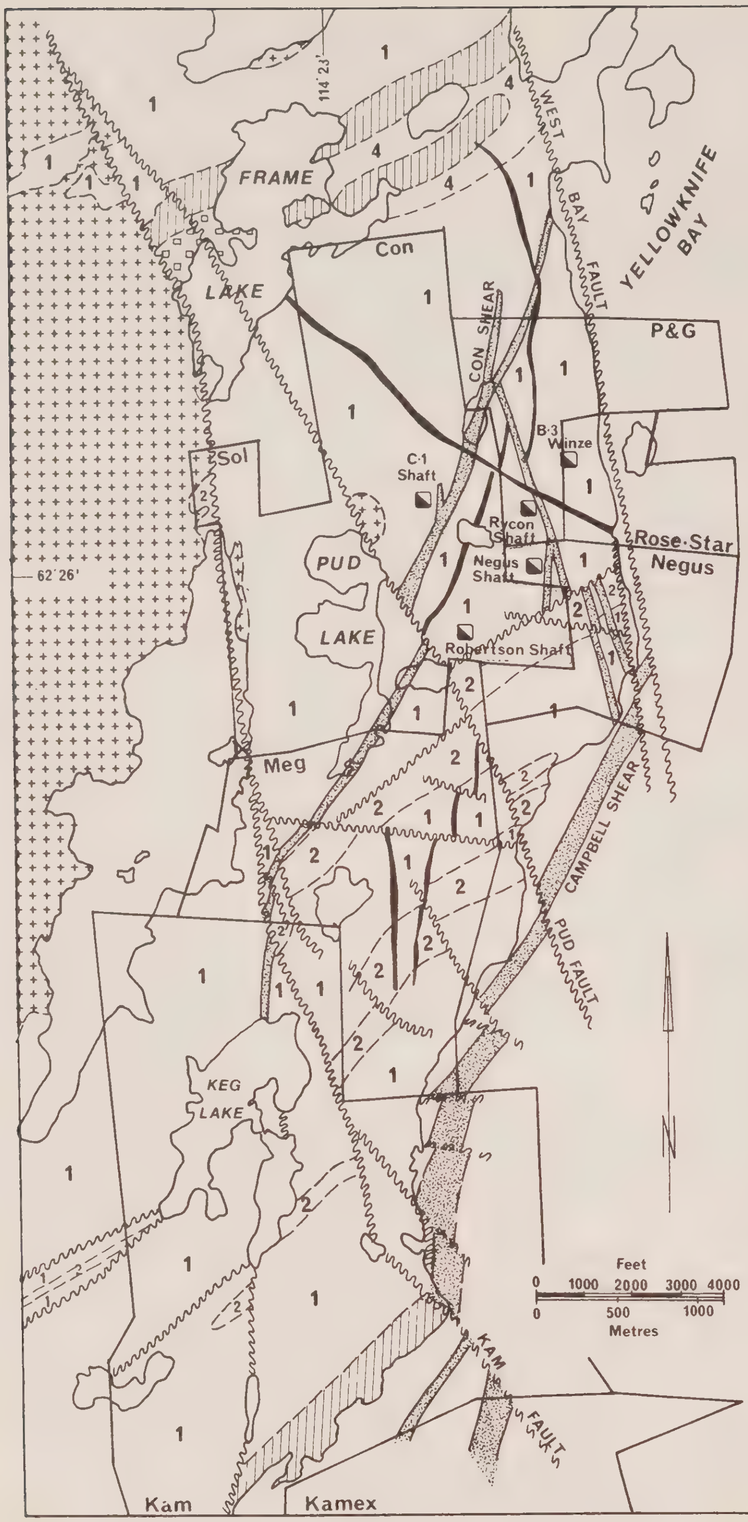


Figure II-5: The Con Mine and Cominco controlled properties (geology from Jones, 1977 and Henderson and Brown, 1967)

is considered to be the faulted extension of the Giant shear zone. The zone ranges from a few hundred feet to more than a thousand feet in width and has been traced over a strike length of 5 miles (8 kilometres).

These shear zones consist of interlacing schist zones and unsheared 'horses' of country rock. The ore bodies, commonly 3 to 20 feet (1 to 6 metres) wide and less than 300 feet (90 metres long, occur around the unsheared 'horses' or at flexures as quartz lenses, pods and veins mineralized with pyrite, arsenopyrite, stibnite, chalcopyrite, sphalerite, sulphosalts, galena and gold.

All current production is from the Campbell shear zone.

CURRENT WORK AND RESULTS

During 1976 the Robertson shaft was completed and the mill's capacity was increased from 450 to 650 tons per day. Gold production increased 16% over last year's due largely to the installation of a trackless haulage system in the lower section of the mine.

Reserves at year-end were 1,470,000 tons grading 0.53 oz/ton Au.

PRODUCTION AND DEVELOPMENT DATA: CON MINE

Year	Tons Milled Daily	Tons Milled in Year	Grade Au oz/ton	Production Au oz.	Average Payroll
1975	405	148,482	0.55	77,708	236
1976	413	151,000	0.62	90,300	238

Year	Drifting	Sinking	Raising	Underground Diamond Drilling
1975	5,886 *1,794*	1,824 *556*	1,052 *321*	43,245 *13,181*
1976	2,975 *907*	1,094 *333*	194 *59*	22,322 *6,804*

All development figures in feet, metres in italics

GIANT MINE
Giant Yellowknife Mines Ltd.,
Yellowknife, N.W.T.

Gold, Silver
85 J/8, 9
62°30'N, 114°22'W

REFERENCES
Baragar (1961, 1962); Boyle (1961); Brown, Dadson and Wrigglesworth (1959); Dadson and Emery (1968); Gibbins *et al.* (1977); Henderson and Brown (1966); Henderson (1970, 1976, 1978); Laporte *et al.* (1978); McGlynn (1971); Thorpe (1966).

PROPERTY
AES 27-50; GIANT 1-21; LOLOR 1-7.

LOCATION
Giant Mine is 3.6 kilometres (2.25 miles) north of Yellowknife, on the west side of Yellowknife Bay (Figs. I-1, II-6).

HISTORY
The GIANT claims were staked in 1935 and acquired in 1937 by Giant Yellowknife Mines Ltd. In 1944 drilling intersected gold bearing shear zones and veins in the Baker Creek Valley. Production commenced in 1948 and a 500 ton per day mill was put into operation. The mill's capacity increased to 1,000 tons per day by 1960.

In 1936 the LOLOR claims were staked and in the 1950's the 750-foot level of Giant Mine was extended into these claims. Production began in October, 1967.

In 1936 the AES or Supercrest property was staked and in 1964 a drift from the 750-foot level of Giant Mine to the Akaitcho ore zone was started. Production began in October, 1967.

In 1974 an open pit was developed near the south end of the GIANT property in a zone which, to a depth of 300 feet (91 metres) contains about 500,000 tons of rock grading 0.3 oz/ton gold. Full-scale production started in 1975.

DESCRIPTION
The country rocks are northeast striking, steeply west-dipping, overturned Archean meta-andesites and metabasalts of the Kam Formation intruded by gabbro dykes. Shear zones containing the Giant ore bodies cut both the volcanics and associated gabbros and are in turn cut by diabase dykes and younger faults (Fig. II-6).

The shear zones consist of subparallel, interlacing chlorite-sericite schist zones and 'horses' of unsheared greenstone. Irregular and lenticular ore bodies ranging from 3.5 to 50 feet (1.1 to 15 metres) in width occurring around the 'horses' are composed of fine-grained quartz and sericite schist with about 7% metallic minerals, mainly pyrite, arsenopyrite, stibnite, sphalerite, sulphosalts and gold.

CURRENT WORK AND RESULTS
During 1976 the Giant property produced 93,378 ounces of gold from 393,730 tons of rock grading 0.27 oz/ton Au. The A-1 open pit contributed 175,480 tons. Mining of the A-1 pit was completed during the year and the stripping of three new pits was started. Diamond drilling totalling 88,000 feet (26,800 metres) indicated 43,000 tons of new ore, putting reserves at year-end at 1,427,000 tons grading 0.33 oz/ton Au.

The LOLOR property produced 1,352 ounces of gold from 5,877 tons grading 0.27 oz/ton Au. Diamond drilling totalling 1,574 feet (480 metres) did not intersect any new ore. Reserves at year-end were 22,000 tons grading 0.39 oz/ton Au.

The Supercrest property produced 11,984 ounces of gold from 28,547 tons grading 0.476 oz/ton Au. Underground diamond drilling totalling 22,235 feet (6,777 metres) added approximately 7,000 tons to an orebody above the 1,100-foot level. Reserves at year-end were 56,000 tons averaging 0.47 oz/ton Au.

PRODUCTION AND DEVELOPMENT DATA:
GIANT-LOLOR-SUPERCREST PROPERTY

Year	Tons Milled	Tons Milled Per Day	Production Au oz	Production Ag oz	Grade Au oz/t	Grade Ag oz/t
1975	391,969	1,073	98,437	21,473	0.29	0.06
1976	428,154	1,173	106,714	25,157	0.28	-

Year	Raising	Drifting	Diamond Drilling Underground	Diamond Drilling Surface	Average Payroll
1975	3,814 *1,163*	10,520 *3,206*	160,040 *48,780*	1,070 *326*	360
1976	1,952 *595*	9,681 *2,951*	151,721 *46,245*	15,426 *4,702*	347

Development data in feet, metres in italics

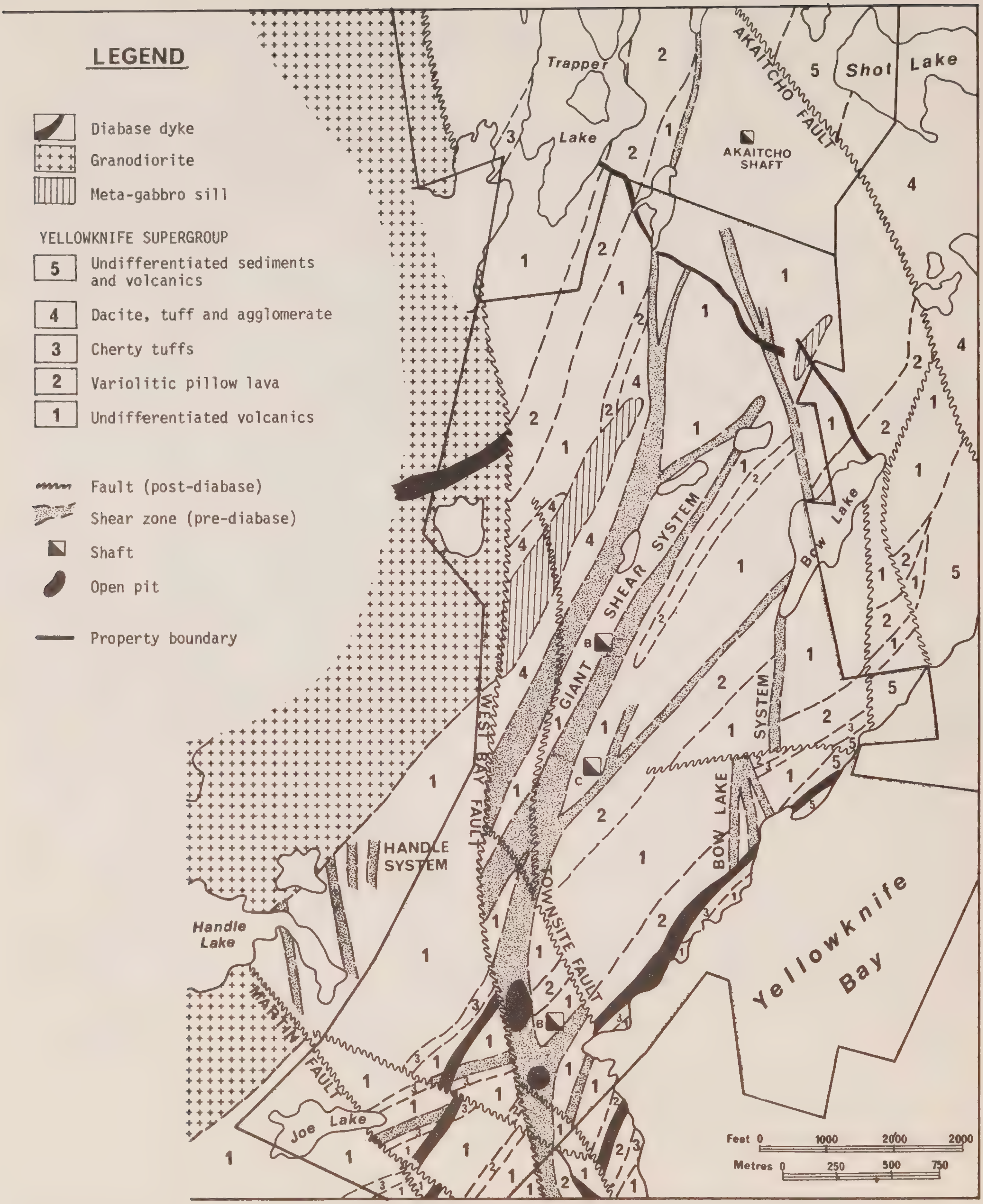


Figure II-6: Giant Mine, geology from Henderson and Brown, 1966.

TERRA MINE,
Terra Mining & Exploration Ltd.,
Suite 204, 8631-109 Street,
Edmonton, Alberta, T6G 1E8

Copper, Silver, Bismuth
86 E/9
65°36'N, 118°07'W

REFERENCES

Gibbins *et al.* (1977); Hoffman *et al.* (1976); Kidd (1936); Laporte *et al.* (1978); Murphy and Shegelski (1972); Shegelski (1973); Shegelski and Thorpe (1972); Thorpe (1972).

PROPERTY

A 1-24

LOCATION

Terra Mine lies on the Camsell River about 5 miles (8 km) from its mouth and 405 km (250 miles) from Yellowknife (Fig. II-7). Access is by winter road from Rae, by barge on the Great Bear Lake - Mackenzie River system or by air to the Terra and Norex airstrips.

HISTORY

The property, first staked as the YAW group, was restaked in 1966 as the A group by Silver Bear Mines Limited, a wholly owned subsidiary of Terra Mining and Exploration Ltd.

In 1967, 31 surface drill holes totalling 9,306 feet intersected a mineralized zone that contained a six-foot section grading 93.8 oz/ton Ag and 1.96% Cu. In 1968, 22 underground holes totalling 3,011 feet were drilled, 1,800 feet of 17% grade inclined shaft was driven to reach a depth of 350 feet below surface.

In 1969 a mill was constructed and milling began at a rate of 150 tons per day in October, 1969.

DESCRIPTION

The country rocks are Aphebian acidic volcanics, volcaniclastics, chert, argillite, sandstone and conglomerate intruded by syenodiorite and syenite (Hoffman *et al.*, 1976). The volcanics and volcaniclastics enclose a 100-foot wide, northwest trending mineralized zone containing more than 10% sulphides, mainly pyrite, pyrrhotite and chalcopyrite with a mixture of argentite, cobalt and bismuth arsenides, native silver and native bismuth. The silver-bismuth-cobalt minerals are concentrated in quartz-carbonate-hematite veins along fractures perpendicular to the zone and considered younger than the disseminated copper mineralization (Shegelski, 1973). Other vein minerals are skutterudite, safflorite, rammelsbergite, pararammelsbergite, matildite and sphalerite.

PRODUCTION AND DEVELOPMENT DATA: TERRA MINE

Year	Tons Milled Daily	Tons Milled in Year	Grade Ag oz/ton	Grade Cu%	Production Ag oz.	Production Cu. lbs.
1975	117	42,881	30.8	0.13	1,320,165	110,382
1976	126	46,090	43.5	0.15	1,900,991	142,176

Year	Lateral	Decline	Raising	Diamond Drilling Underground	Diamond Drilling Surface	Average Payroll
1975	8,932	-	2,637	9,020	-	57
1976	10,719	1,779	3,827	10,589	5,870	53

CURRENT WORK AND RESULTS

In 1976 production came mainly from the No. 10 and No. 11 veins. The No. 9b vein was developed and stoped. At year-end the main haulageway decline had been extended past the 10th level. Several deep diamond drill holes confirmed the extension of the mineralized zone to a vertical depth of 1,900 feet or 800 feet below current workings. In one of these holes a favourable zone containing sulphides and silver was intersected beneath the Camsell River, about 1,200 feet north of the mine.

NORTHRIM MINE
Northrim Mines Limited,
206, 640-11th Avenue S.W.,
Calgary, Alberta.

Silver, Bismuth, Lead
86 F/12
65°36'N, 117°58'W

REFERENCES

Hoffman *et al.* (1976); Lord (1951); Lord and Parsons (1952); Padgham, Kennedy *et al.* (1975); Padgham, Shegelski *et al.* (1974); Parsons (1948); Thorpe (1972).

PROPERTY

LM 1-8

LOCATION

The property is on the north shore of Camsell River, about 396 kilometers (246 miles) northwest of Yellowknife (Figs. I-1, II-7).

HISTORY

The OTTER claims were staked for A.X. Syndicate in 1932 to cover silver-bearing veins. In 1933 White Eagle Silver Mines Limited acquired the claims and drove an adit on the main vein. In 1946 geological mapping, trenching and 1,750 feet (533 metres) of diamond drilling in 26 holes was done east of the adit by Camsell River Silver Mines Limited. This outlined a 260-foot (80-metre) long, 46-inch (1.2-metre) wide ore shoot averaging 34 oz/ton Ag. A fifty-four pound sample from this shoot assayed 2,442.66 oz/ton Ag and 7.3% Pb. The ground was relinquished and restaked as LM 1-8 by F. Lypka in 1962. In 1967 four to six tons of high grade rock averaging 438 oz/ton Ag were mined. In 1968 Silver Bay Mines Limited drove a 165-foot (50-metre) adit with three raises. Samples assayed from 20 to 450 oz/ton Ag over a 3 to 4-foot (1 to 1.5 metre) width. In 1970 Federated Mining Corp. Ltd. acquired an interest in the property, renovated the underground workings and stockpiled 3,000 tons of high-grade rock. A 100-ton per day mill operated from December, 1971 until June, 1972. In 1973 Federated Mining Corp.'s Camsell Holdings Limited which operated the mine, was acquired by Northrim Mines Limited.

DESCRIPTION

The property is underlain by Aphebian intermediate and basic lavas and air-fall tuffs intruded by a syenite-monzonite complex to the north (Hoffman *et al.* 1976). Faults and fractures in the volcanic rocks contain silver-bearing quartz-carbonate veins. Vein minerals include pyrite, arsenopyrite, chalcopyrite, sphalerite, galena, native bismuth, bismuthinite, safflorite, rammelsbergite, hematite, argentite, niccolite and native silver.

CURRENT WORK AND RESULTS

About 1,400 feet (430 metres) of diamond drilling were completed during the year. The 100 ton per day mill started producing at 50 tons per day in October, 1976 and the concentrate has been stockpiled for shipment in 1977.

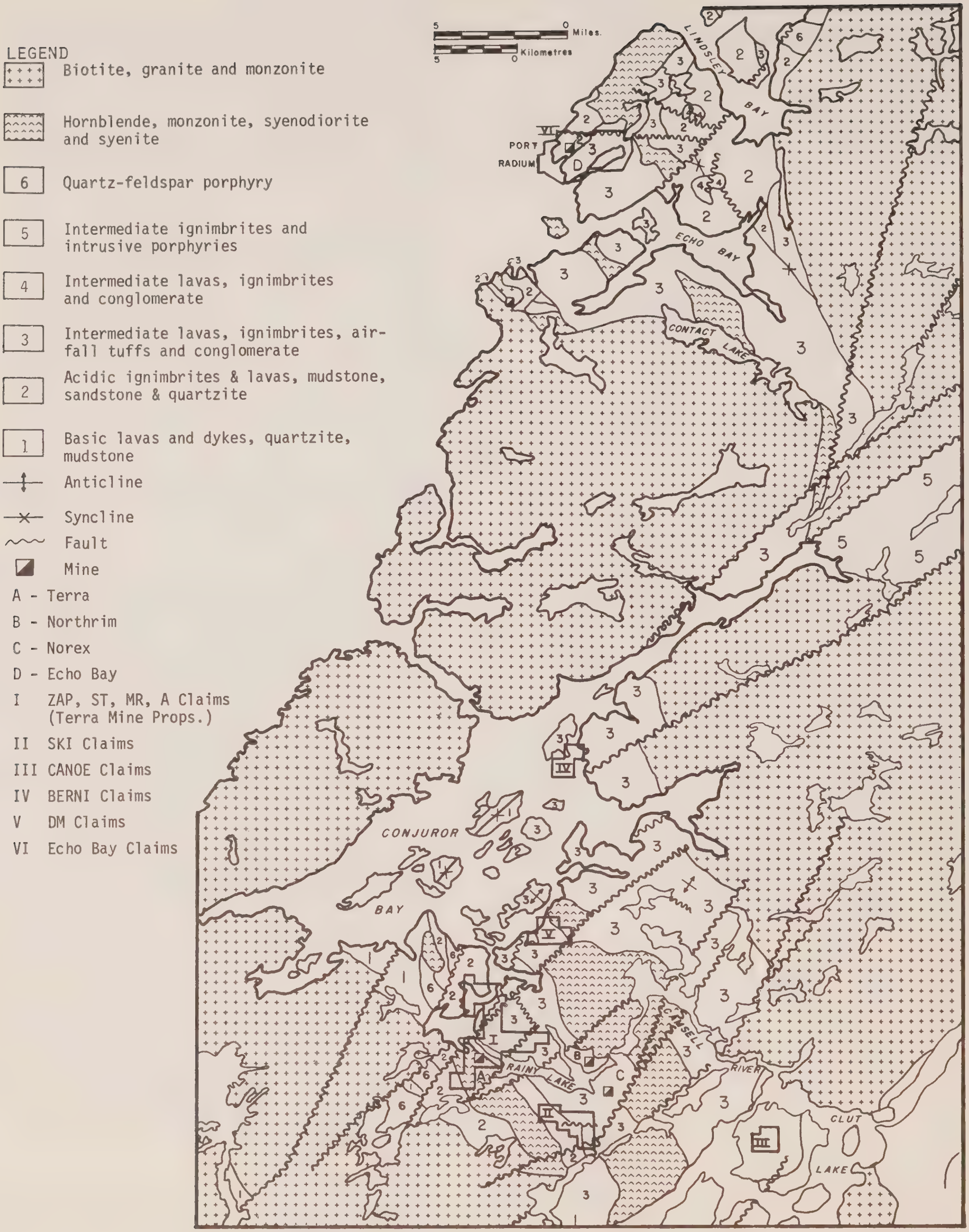


Figure II-7: Geology of Echo Bay/Camsell River area after Hoffman *et al.*, 1976

ECHO BAY MINE
Echo Bay Mines Ltd.,
408, 10355 Jasper Avenue,
Edmonton, Alberta T5J 1Y6

Silver, Copper
86 K/4, L/1
66°06'N, 118°00'W

REFERENCES
Gibbins *et al* (1977); Hoffman and Bell (1975); Hoffman *et al* (1976); Lord (1951); Mursky (1973); Padgham, Kennedy *et al* (1975); Robinson (1971); Robinson and Ohmoto (1973); Schiller (1965); Schiller and Hornbrook (1964); Thorpe (1966, 1972).

PROPERTY
ECHO BAY 1-12

LOCATION
Echo Bay Mine is one mile northeast of Port Radium on Great Bear Lake (Figs. I-1, II-7). The mine is served by ice or gravel airstrips, by Northern Transportation Company barges or by winter road from Rae, 250 miles (400 kilometres) to the south.

HISTORY
The claims were staked in 1930 for Consolidated Mining and Smelting. Two adits were driven on the western part of the property in 1934 to explore five mineralized veins. In 1963 Echo Bay Mines Limited acquired the property and in October, 1964 production commenced from the two adit levels. The Eldorado plant and 140-ton mill were purchased in 1966. In 1968 a shaft with two levels was sunk from a third adit opened in 1967. The shaft was deepened to 1,250 feet (380 metres) providing eight levels in 1970 but a 150-foot (45 metre) thick diabase dyke was encountered between the 4th and 6th levels and by mid-August, 1974 the ore in the mine was almost exhausted. The mill reopened in February, 1975 to treat ore recovered by clean-up operations in the mine.

Since June, 1974 dewatering and an extensive development program have been carried out by Echo Bay Mines Ltd. on the adjacent Eldorado uranium workings in order to mine remaining silver ore.

DESCRIPTION
The area is underlain by northeast striking Aphebian andesitic lavas, ignimbrites, air-fall, tuffs and conglomerates (Hoffman *et al*, 1976). Within the mine the volcanics dip 35° to 40° southeast and are cut by a 150-foot (45 metre) thick diabase sill and two 100-foot (30 metre) thick diabase dykes of Helikian age.

The Echo Bay veins are quartz-carbonate filled fractures and shears found mostly within the tuffs. Within the mine these veins are offset approximately 300 feet (90 metres) by the northeast striking A fault. Vein minerals identified are argentite, native silver, galena, sphalerite, nicolite, pitchblende, hematite, chalcopyrite and bornite.

CURRENT WORK AND RESULTS
By November, 1976 Echo Bay Mines Ltd. completed mining its reserves. From December all mine production was provided from the reopened Eldorado workings. Development and exploratory work during the year consisted of 26,255 feet (8,000 metres) of underground diamond drilling, 3,273 feet (998 metres) of surface drilling, 3,724 feet (1,135 metres) of drifting and 811 feet (247 metres) of raising.

PRODUCTION DATA: ECHO BAY MINE

Year	Tons Milled Daily	Tons Milled in Year	Grade Ag oz/ton	Grade Cu%	Production Ag oz.	Production Cu lbs.	Average Payroll
1975	85	31,251	28.4	1.28	876,346	790,375	112
1976	108	39,387	47.2	1.1	1,866,000	879,000	115

CANTUNG MINE
Canada Tungsten Mining Corp. Ltd.
P.O. Box 9,
Tungsten, N.W.T.

Tungsten, Copper
105 H/16
61°57'N, 128°15'W

REFERENCES
Blusson (1968); Brown (1961); Cummings and Bruce (1976); Findlay (1967, 1969); Gabrielse *et al.* (1973); Green (1965, 1966); Green and Goodwin (1963, 1964); Laporte *et al.* (1978); Skinner (1961, 1962).

PROPERTY
AC 1-7; AIR 1-6, 24-38, 52-65, 69, 70, 80, 81, 85-96; B 1-36; BC 1-8, 10-11; CED 1-49, 59-65, 67-73; ED 1-20; EF 2, 5-8; L 1-36; O 1-36; P 1-36; PK 1-30; R 1-36; RL 1, 3-5, 8-10, 19-20; V 1-36; WO 1-11; Y 1-36.

LOCATION
Cantung Mine lies near the headwaters of the Flat River in the Selwyn Mountains, 209 kilometres (130 miles) north of Watson Lake and less than 3 kilometres (2 miles) from the Yukon border. (Figs. I-1, II-8) Access is by an all-weather, 306-kilometre (190-mile) gravel road from Watson Lake or via a 1,219-metre (4,000-foot) gravel airstrip at the mine site.

HISTORY
The area was staked as a copper prospect in 1954 but lapsed and was restaked for tungsten in 1958. In 1959 Canada Tungsten Mining Corp. Ltd. was formed to develop the property and by 1960, 3,658 metres (12,000 feet) of diamond drilling had outlined 1,320,000 tons grading 2.5% WO_3 and 0.5% Cu. Open pit mining began in 1961 and continued until 1973 with shutdowns in 1963 due to low tungsten prices and in 1967 due to the destruction of the mill by fire. Remaining reserves in the pit are 250,000 tons of skarn ore at 1.35% WO_3 and 615,000 tons of chert ore at 0.80% WO_3.

In 1971 drilling intersected ore grades 615 metres (2,000 feet) north-northwest of the pit. By 1973 4,242,000 tons grading 1.68% WO_3 and 0.22% Cu had been outlined. In 1974 the operation switched from open pit to underground mining.

DESCRIPTION
The mine area is underlain by a north-northwest trending syncline of Lower Paleozoic argillite, limestone, dolomite and chert (Fig. II-8). On the flank of the syncline is an overturned anticline of Lower Cambrian strata. Within the anticline a Cretaceous quartz monzonite intrusive has altered limestone to a diopside-garnet skarn which hosts the orebodies.

The open pit orebody was a shallow, southwest dipping lens, about 91 metres (300 feet) wide and as much as 20 metres (65 feet) thick, comprising fine disseminated sheelite in a massive to heavily disseminated pyrrhotite-chalcopyrite-sphalerite matrix crosscut by quartz-microcline-scheelite stringers. The low grade chert zone contains scheelite and pyrrhotite. The underground orebody is over 610 metres (2,000 feet) long, averages 12 metres (40 feet) thick,

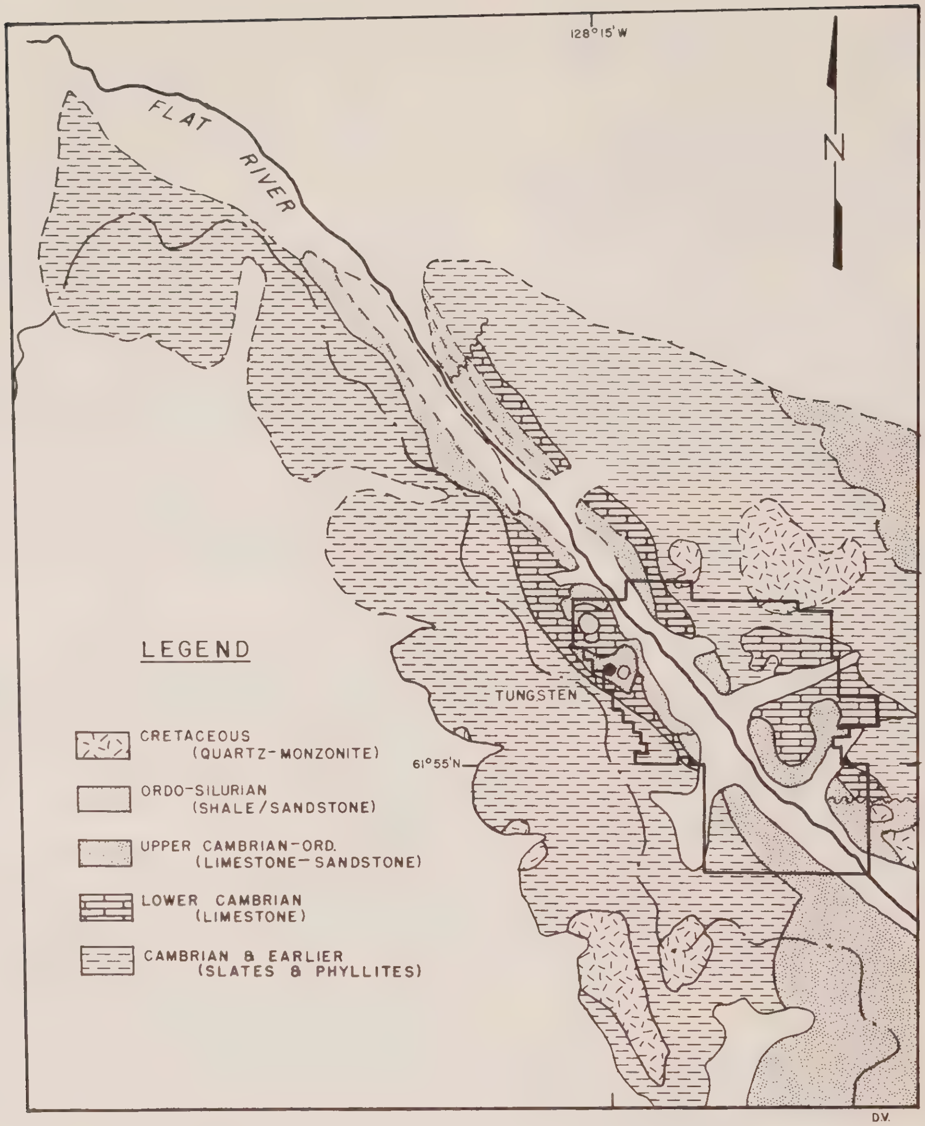


Figure II-8: Geological sketch map showing Canada Tungsten Mining Corp. Ltd.'s property in the Flat River area (geology after Gabrielse *et al.*, 1973).

and contains scheelite and chalcopyrite disseminated in bands of 30-40° pyrrhotite.

CURRENT WORK AND RESULTS

About 614 metres (2,014 feet) of stoping, 793 metres (2,602 feet) of drifting and crosscutting and 1,507 metres (4,943 feet) of diamond drilling were completed on the underground orebody during the year. This outlined on the western extension of the orebody 875,000 tons averaging 1.65% WO_3. Reserves are now 4,190,100 tons grading 1.55% WO_3.

PRODUCTION DATA: CANTUNG MINE

Year	Tons Milled Per Day	Tons Milled In Year	Grade WO_3%	Production WO_3 lbs.	Average Payroll
1975	490	179,032	1.28	3,257,840	158
1976	516	188,934	1.55	4,779,960	156

ARCTIC ISLANDS REGION

Walter A. Gibbins
D.I.A.N.D., Geology Office, Yellowknife

The Arctic Archipelago is divisible into several major geological provinces. Precambrian rocks of the Northern Canadian Shield are exposed in the Minto Arch, Boothia Uplift, and Baffin Island and form a crystalline basement under much of the younger sedimentary cover. The north trending Cornwallis Fold Belt, which divides the Arctic Platform and Franklin Geosyncline into eastern and western parts, developed mainly in Silurian and Devonian time in response to periodic faulting caused by movements of the Boothia Uplift. The Sverdrup Basin, which in late Proterozoic and Mesozoic time was superimposed on the folded Franklin Geosyncline, was itself folded in the Cenozoic.

Figure III-1: Mineral exploration on Baffin Island

In 1976 mineral exploration was for uranium and lead-zinc deposits and mostly in the Precambrian of Baffin Island (Fig. III-1).

Regular jet service is available to Resolute Bay, Nanisivik, Frobisher Bay, Cambridge Bay and Inuvik. Most Arctic settlements have scheduled Twin Otter flights at least once a week; but camp-moves and resupply flights for exploration crews are usually done by chartered Twin Otters equipped with oversize tires for landing directly on the Arctic tundra. These aircraft are available in Resolute Bay and Frobisher Bay.

PROSPECTING PERMITS 402-406	27 C/1,2,6,14
Cominco Ltd.,	27 F/4
Suite 1700, 120 Adelaide St. W,	69°30'N, 70°W
Toronto, Ontario, M5H 1H2	

REFERENCES

Escher and Pulvertaft (1976); Escher and Watt (976); Henderson and Pulvertaft (1967); Heywood (1967); Jackson (1969, 1971); Jackson and Taylor (1972); Keen *et al.* (1972); Kranck (1951, 1955); Laporte (1974b).

PROPERTY

Prospecting Permit 402	27 C/1
Prospecting Permit 403	27 C/2
Prospecting Permit 404	27 C/6
Prospecting Permit 405	27 C/14
Prospecting Permit 406	27 F/4

LOCATION

The area is in the east central part of Baffin Island. The permits lie near the head of McBeth Fiord and other fiords in the area. The centre of the area is half way (70 miles) between the Dewar Lakes DEW line site and the Inuit community of Clyde River. Part of permit area 406 is within 10 miles of the Barnes Ice Cap (Fig. III-2).

Access to the area is by Twin Otter equipped with oversized tires from Frobisher Bay. A Jet Ranger helicopter was used locally.

HISTORY

Kranck (1951, 1955) was the first to map and discuss the mineral potential of the area and compare it with other parts of Northeastern Canada and Western Greenland.

Canadian Nickel Co. (Inco) and Murray Watts are believed to have explored in the area in the late 1950's to early 1960's. Aquitaine Ltd. prospected rusty soils and gossans in the general area in 1971 (Laporte, 1974b). They reported low zinc and copper values.

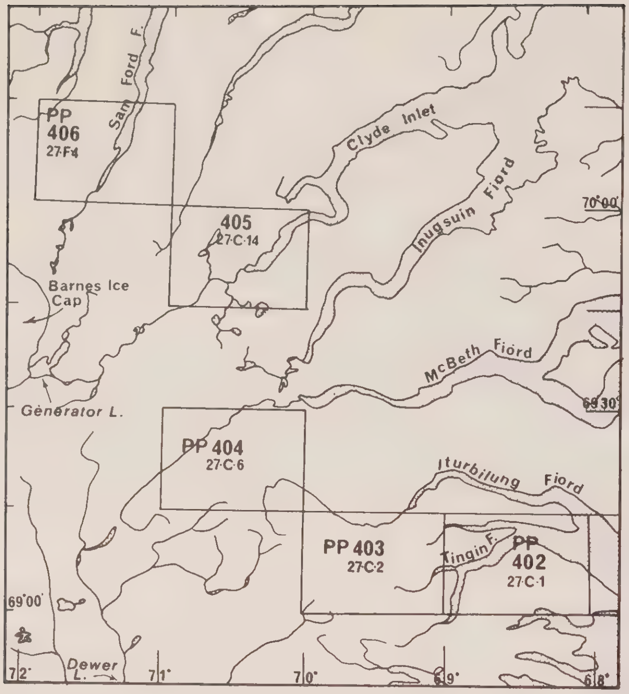


Figure III-2 Cominco Ltd. permit areas, Central Baffin Island

DESCRIPTION

The eastern part of the area is dominated by steep walled fiords. Inland, the area changes to a mountainous terrain extensively covered with permanent icefields and glacial debris and the western edge of the area is a plateau with rolling hills and flat plains.

Most of the area is underlain by metasediments of the Piling Group (Jackson, 1969 and 1971). These rocks appear to be similar and seem to have the same geological history as other early Proterozoic (Aphebian) supracrustals resting on Archean basement in Northeastern Canada and Western Greenland (Table III-1 and Fig. III-3).

The area is also characterized by large scale recumbent isoclinal folds and nappes, and areas of large gneiss domes. Major thrust faults (related to nappes) and block faults occur. Intense plastic and penetrative deformation, migmatization and pegmatite emplacement are found in the area. K-Ar ages of 1,650 to 1,800 m.y. B.P., characteristic of the Hudsonian Orogeny, indicate widespread thermal or tectonic events have not affected the area since then.

The Clyde River McBeth Fiord area is part of the Fox Fold Belt structural province. The Rinkian Mobile Belt of West Greenland (Escher and Pulvertaft, 1976), which contains important carbonate hosted lead-zinc deposits in the Umanak area, is so similar that it is easily recognizable as the easterly extension of the Fox Fold Belt. Despite this simple fit of Precambrian geology on either side of Baffin Bay, the manner and timing of events that produced the present separation has proven to be complex and controversial (see Keen *et al.*, 1972 for discussion).

The Geological Survey of Canada mapped the area in 1968 (Jackson, 1969, 1971) on a scale of 1:250,000, but these maps are, as yet, unpublished.

CURRENT WORK AND RESULTS

In July and August, 1976 six geologists mapped, prospected and sampled silts and rocks in the area. Emphasis was placed on the discovery of Black Angel

Table III-1 Stratigraphy of Aphebian strata of Northeastern Canada and Western Greenland

PRINCE ALBERT GROUP	MARY RIVER GROUP	HOARE BAY GROUP	PENRHYN GROUP	PILING GROUP	KARRAT AND UMANAK GROUPS
Modified from Heywood 1967	Jackson 1966, 1969	Jackson, 1971	Modified from Heywood 1967	Jackson, 1969, 1971	Henderson and Pulvertaft 1967
Quartz-mica schist phyllite, paragneiss, quartzite; minor basic metavolcanics	Metagraywacke, meta-shale, quartzite, meta-conglomerate; meta-basalt, meta-gabbro, serpentine, anorthosite predominate locally at various horizons including the base	Metagraywacke, meta-shale, meta-siltstone, quartzite; iron formation, meta-basalt, meta-gabbro, serpentine in lower part	Paragneiss, biotite-quartz-plagioclase schist, metagraywacke; minor marble, quartzite, iron formation in lower part	Metagraywacke, meta-siltstone, meta-shale; quartzite, marble in upper part; meta-basalt, serpentine, marble, iron formation, rusty paragneiss in lower part	Metagraywacke rare graphite and pyrrhotite schist. Quartzite and semipelitic to pelitic schist
Iron formation	Iron formation	Rusty sulfide-bearing schist, chert (iron formation?)	Rusty graphitic sulfide-bearing meta-sediments	Rusty graphitic sulfide-bearing meta-chert, and quartz mica paragneiss, iron formation	Amphibolite, rusty biotite-schist
Quartz-mica schist meta-sediments		Marble, quartzite, meta-arkose, micaceous meta-sediments, paragneiss	Marble, calc-silicates, quartzite	Marble, calc-silicates	Marble, calc-silicates, quartzite
			Paragneiss, biotite-quartz-plagioclase schist		Hornblende schist and amphibolite
Quartzite	Quartzite, meta-arkose, aluminous metasediments, mica gneiss, meta-conglomerate		Quartzite, schist, marble	Quartzite, meta-arkose	
Basic metavolcanics	Metasediments; local acid metavolcanics, meta-basalt				

Figure III-3: Aphebian rock groups, fold belts, and tectonic trends in northeastern Canada and Greenland. Modified after Jackson and Taylor (1972) and Escher and Watt (1976).

type mineralization in marble units in and adjacent to the permit areas. A number of small uneconomic mineral occurrences were discovered and some of the mineral occurrences reported by Kranck (1951) were revisited.

Cominco Ltd. relinquished all five permits in the spring of 1977.

CAPE DORSET PROJECT	Uranium
Imperial Oil Ltd.,	36 B/5, C/7, 8
111, St. Clair Ave. West,	64°25'N, 76°W
Toronto, Ontario, M5W 1K3	

REFERENCES
Blackadar (1959, 1962, 1967); Laporte (1974a); Maurice (1975, 1977).

PROPERTY

TED 1-37	36 B/5
HEW 1-148	36 C/7
CHO 1-80; MIN 1-81; PIT 1-57; RAY 1-16	36 C/8

LOCATION
The HEW group is 12 to 18 miles north-northwest of Cape Dorset on southwestern Foxe Peninsula. The other claims are 10 to 25 miles north to northeast of the settlement.

HISTORY
In 1967 Mr. Ross Toms interested the Snowdrake Syndicate in uranium possibilities on Southern Baffin Island and did airborne radiometric surveys on their behalf. Anomalous radioactivity was detected in the Cape Dorset area, and later that year several pegmatites along the coast between Negus and Catherine Bays were examined and sampled.

In 1969 the Kabluna Syndicate became interested and obtained several exploration permits in southern Baffin Island, including two in the Cape Dorset area (36 B/5 and C/8). Numerous radioactive anomalies were outlined in the belt of paragneiss, marble, granite and pegmatite between Cape Dorset and Andrew Gordon Bay. The TIM, PAT and DON claims were staked in NTS 36 C/8 (Laporte, 1970a, p. 138-139). The most significant find is on the TIM claims where uranium and thorium occur in a zone of biotite paragneiss and concordant granite pegmatite at least 1,900 feet long and from 50 to 250 feet wide. The average grade of 25 selected samples was 1.16 pounds per ton U_3O_8 and 0.54 pounds per ton ThO_2. The highest-grade sample assayed 6.80 pounds per ton U_3O_8 and 1.08 pounds per ton ThO_2. In many places the outcrop surface is heavily stained by secondary uranium minerals. Uraninite is the source of most of the radioactivity in fresh pegmatite samples. Maurice (1977) observed molybdenite in several hand specimens.

DESCRIPTION
Southern Baffin Island consists of a complexly folded generally northwest-trending, succession of granite, migmatite, and quartz-feldspar gneisses which commonly contain layers of diopsidic marble, graphitic schists, quartzites and mafic schists and gneisses. They were last affected by metamorphism 1,650 to 1,750 million years ago during the Hudsonian Orogeny (Blackadar, 1959, 1962 and 1967).

Northeast of Cape Dorset, radioactivity is associated with pegmatite dykes and sills which intrude all rocks except marble. Radioactivity is associated irregularly with dykes and sills of pegmatite but where these occur together only one may be radioactive. Granite and rusty paragneiss also contain radioactive patches.

In the summer of 1975 Imperial Oil Limited surveyed the area north of Cape Dorset using a helicopter-mounted scintilometer and examined 51 anomalies on the ground. The five claim groups were staked as a result of this survey. The Geological Survey of Canada did a geochemical orientation survey for uranium and base metal exploration in the same area (Maurice, 1975, 1977a). It was recommended that both lake waters and sediments be sampled because of erratic variation in lake water alkalinity.

CURRENT WORK AND RESULTS

Sixteen zones, found during 1975, were prospected and mapped at a scale of 1 inch to 1 mile. Nine of these zones contained relatively high uranium and were bulk sampled. Several hundred line miles of airborne radiometrics detected additional anomalies. Many of these were examined and the RAY claims were staked.

Most of the occurrences are pegmatitic in character. A few hundred tons, grading upwards of 2.0 pounds U_3O_8 per ton in several widely separated lenses, were outlined but this is not economically significant at present.

Many of the 1975 claims have lapsed.

PROSPECTING PERMITS 385 & 386 — 47 F/1, 8
Noranda Exploration Ltd., — 70° to 70°30'N
P.O. Box 1619, — 84° to 85°W
Yellowknife, N.W.T., XOE 1HO

REFERENCES

Blackadar (1958, 1963, 1970).

LOCATION

The permits are north of Fury and Hecla Strait, which separates Northwest Baffin Island from the Melville Peninsula. Whyte Inlet marks the southwest corner of the permits (Fig. III-4). Igloolik, 90 miles to the southeast, and Hall Beach, 40 miles south of Igloolik, are the only nearby communities. Hall Beach has regular jet service from Montreal via Frobisher Bay twice a week and a Twin Otter is based in Hall Beach.

HISTORY

The first geological observations of the area were made by W.E. Parry in the early 19th century. Present geologic information is based on work done by the Geological Survey of Canada in the 1950's (Blackadar, 1958, 1963 and 1970).

A 1975 lake sediment reconnaissance of Northern Baffin Island outlined anomalies in both basement rocks and overlying Helikian sediments between Autridge and Sikosak Bays (Fig. III-4). Noranda Exploration Ltd. was granted prospecting permits 385 and 386 in April, 1976.

DESCRIPTION

Fury and Hecla Strait coincide with a 125 by 25 mile belt of gently dipping Helikian sediments (Fig. III-4), that lie unconformably on an Aphebian basement complex of coarse grained migmatite, gneiss and granite. Blackadar (1970) defined two formal units:

1. the Autridge Formation (3b, c and d) consisting of 1,500 feet of black siltstone and shale with ferruginous dolomite, which outcrops south and west of the Noranda permits and
2. the Fury and Hecla formation (3a in Fig. III-4) covering the entire southern permit and resting directly on the basement. This unit consists of 15,000 feet of varicolored massive quartzitic

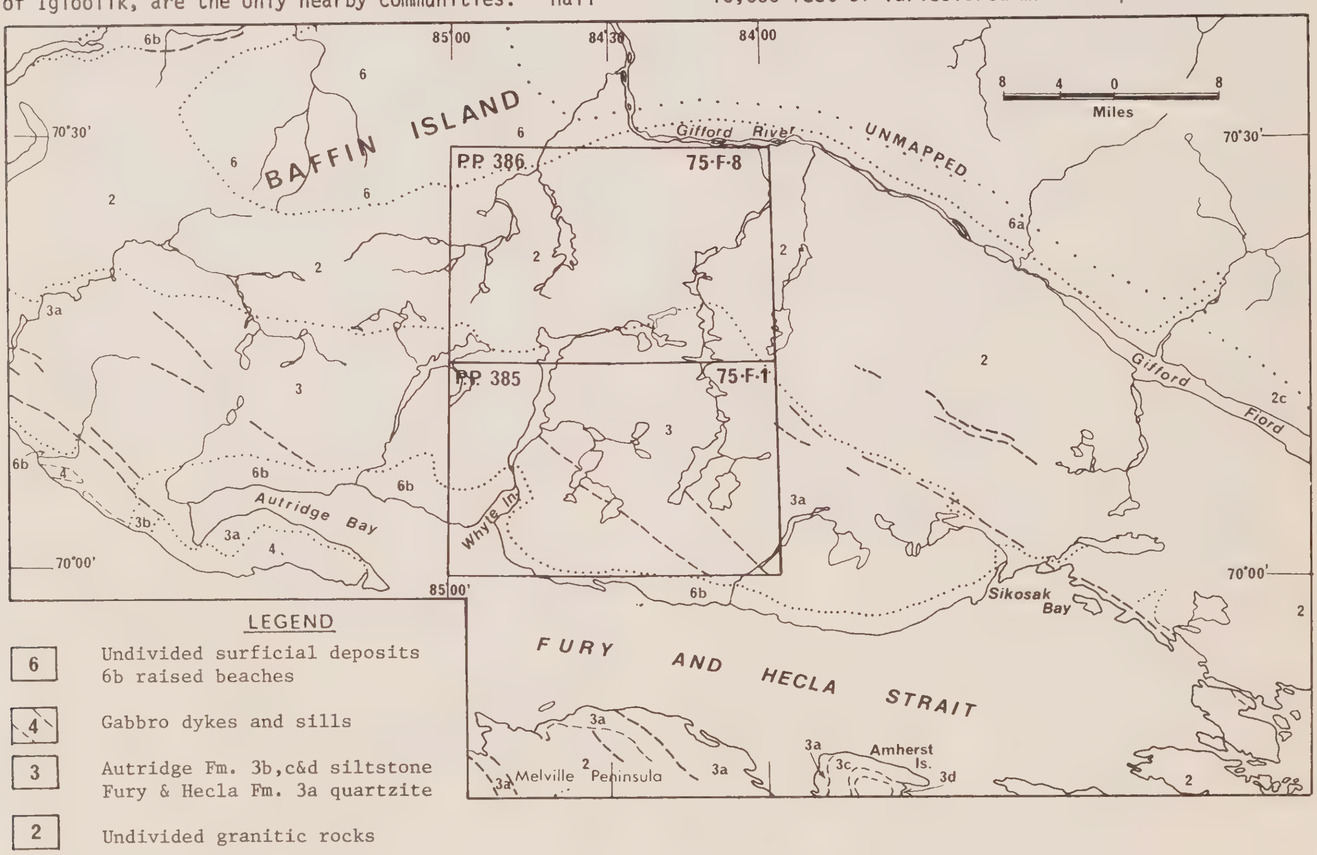


Figure III-4: Geology of Fury and Hecla Straits Area

sandstone and is commonly cross bedded and ripple marked. A discontinuous basal conglomerate is also part of the Fury and Hecla Formation.

Late Helikian gabbro dykes and sills are found in the permit areas and undisturbed Paleozoic sediments lie to the west and southeast.

CURRENT WORK AND RESULTS

In 1976, four geologists did helicopter and ground radiometric surveys and geologic mapping of the permits and the adjacent area. The highest geochemical anomalies obtained in the 1975 work were related to radioactive (thorium enriched) granites and pegmatite found in the northern permit. Smaller anomalies in the southern permit (underlain by the Fury and Hecla Formation) coincided with boulder fields of granite geniss.

A small zone of uranium mineralization adjacent to a quartz vein was located in sandstone and a grab sample of the best material assayed 493 ppm. U_3O_8.

The permits were relinquished in March, 1977.

WHALE CLAIMS
Nanisivik Mines Ltd.,
Suite 100, 330 - 5th Ave. SW,
Calgary, Alberta, T2P OL4

48 C/1
73°01'N, 84°16'W

REFERENCES

Blackadar *et al.* (1968); Clayton (1966); Gibbins *et al.* (1977).

PROPERTY

WHALE 1-25

LOCATION

The WHALE claims are about six miles east of the Nanisivik Mine on Northern Baffin Island. Access from the mine site is by skidoo in winter, though vehicles can be used if the road is clear of snow.

HISTORY

The WHALE claims were staked in 1974 by Watts, Griffis and McOuat Ltd. on behalf of Mineral Resources International Ltd. They are immediately east of mineral leases that make up the Nanisivik property.

DESCRIPTION

The area is underlain by Helikian Society Cliffs and Victor Bay Formations (Blackadar *et al.*, 1968). The former consists of a blocky, cliff-forming light brown dolomite that is typically an algal laminate and commonly brecciated. It is also the host rock for massive sulphide mineralization at the Nanisivik mine six miles to the west (Gibbins *et al.*, 1977).

CURRENT WORK AND RESULTS

A VLF EM survey and a follow up magnetometer survey were carried out during May through July. North-south lines, perpendicular to the trend of the Nanisivik ore body, were laid out 400 feet apart and more than 20 miles of line were surveyed using a station interval of 100 feet. Maps of in phase data were prepared.

GULL CLAIMS
Nanisivik Mines Ltd.,
Suite 100, 330 - 5th Ave. SW,
Calgary, Alberta, T2P OL4.

48 C/1
73°02'N, 80°36'W

REFERENCES

Blackadar *et al.* (1968); Clayton (1966); Geldsetzer (1973a, b); Gibbins *et al.* (1977); Lemon and Blackadar (1963).

PROPERTY

GULL 1-28

LOCATION

The claims are situated about a mile south of Strathcona Sound, Northern Baffin Island. They are immediately west of the Nanisivik mineral lease.

HISTORY

The GULL claims were staked in 1972. Geological and VLF EM surveys were done on the claims in 1974 (Gibbins *et al.*, 1977).

DESCRIPTION

The region is underlain by a sequence of Helikian sediments that are generally flat lying but commonly block faulted. The most recent regional geological maps are those of Blackadar *et al.* (1968) and Lemon and Blackadar (1963). However, the Geological Survey of Canada did additional mapping in the area in 1977 (Jackson, personal communication).

The GULL claims are underlain by dolomitic shales of the Victor Bay Formation, except for a small area of sandstone of the overlying Strathcona Sound Formation in the southeast corner. The Society Cliffs dolomite, which normally underlie the Victor Bay Formation and contains the lead-zinc mineralization at Nanisivik (Geldsetzer, 1973a, b and Gibbins *et al.*, 1977), does not outcrop on the claims, but geological mapping and drilling to the east of the claims suggest it is present at a depth of 400 feet. Almost 1,000 feet of Society Cliffs Formation has been measured in the region, thus it should occur on the claims at depths between 400 and 1,400 feet, however, extensive pre Victor Bay karsting in the area (Geldsetzer, 1973a, b) may have removed some of the Society Cliffs Formation.

CURRENT WORK AND RESULTS

A depth of the favourable unit and the known low conductivity of sulphides in the area (Clayton, 1966) necessitated the choice of EM systems with maximum depth preparation. The VLF EM-16 system used in 1974 can detect the Nanisivik ore body at a depth of 500 feet, but it did not detect any economically significant anomalies on the GULL claims.

The McPhar 5515 system was chosen in the 1974 survey to give deeper penetration. The transmitter is powerful enough to be operated at spreads of over 2,000 feet, giving a potential penetration to over 1,000 feet. Several EM anomalies were detected, but most of these appear to be caused by gabbro dykes.

SUP CLAIMS
Canadian Superior Exploration Ltd.,
Suite 2201,
1177 West Hastings Street,
Vancouver, B.C., V6E 2K3

Lead, Zinc
58 F/14
74°58'N, 94°30'W

REFERENCES

Kerr (1977a and 1977b); Gibbins *et al.* (1977);

Thorsteinsson (1958); Thorsteinsson and Kerr (1968).

PROPERTY
SUP 1-114

LOCATION
The claims are 20 miles north-northeast of Resolute Bay and include the headwaters of the Bacon River.

HISTORY
The claim area was part of Prospecting Permit 55 (1966-1969) and 255 (1971-1974), both held by Cominco Ltd. Exploration in the area led Cominco to stake the ALL and BRAN groups to include lead-zinc showings in the Allen Bay Formation in the Allen Branch Graben (Kerr 1977a, Gibbins *et al.*, 1977).

In 1973 Canadian Superior Exploration Ltd. staked the BAC group to the east of the ALL-BRAN claims, where lead-zinc mineralization occurs in the exposed lowermost Thumb Mountain and Bay Fiord Formations on the southeasterly dipping limb of the Bacon River Anticline.

In the spring of 1974, following the expiry of Cominco's exploration permit, the SUP claims were staked north of the ALL-BRAN claims and geological, geochemical and gravity surveys were done on both the SUP and BAC groups.

DESCRIPTION
The property lies along the western flanks of the Bacon River Anticline (Thorsteinsson and Kerr, 1968) and is dominated by a prominent north-south fold system complicated by northerly to northwesterly and easterly trending faults. Numerous showings and geochemical anomalies, the majority of which are minor, occur in dolomite rubble of the lowermost Thumb Mountain Formation. Mineralization may consist of massive sphalerite, smithsonite and/or hydrozincite, galena and pyrite. Pseudobrecciation associated with sulphides in other parts of the Cornwallis Lead-Zinc District is virtually absent.

The SUP, BAC, ALL and BRAN claims and showings thereon are all considerably south of the facies change that separates shales of the Cape Phillips Formation from the carbonates of the Allen Bay, Cape Storm, and Read Bay Formation (Thorsteinsson, 1958; Thorsteinsson and Kerr, 1968; Kerr, 1977b). This factor and the absence of the sub-Disappointment Bay Formation unconformity, which may or may not have been present, the absence of the upper part of the Thumb Mountain Formation and the lack of pseudobreccias indicate that the area does not contain typical mineralization of the Cornwallis Lead-Zinc District (Kerr, 1977a).

CURRENT WORK AND RESULTS
In April, 1976, 94 holes, totalling 9,783 feet, were drilled on the SUP group using a Nodwell mounted rotary drill. This kind of drill is normally used for drilling seismic shot holes. Targets included major showings, some minor showings and geochemical and gravity anomalies.

Interpretation of the drilling results was handicapped by errors in previous mapping related to complex structure. Mineralization may be related in part to faulting.

DIAMOND-KIMBERLITE RECONNAISSANCE 58, 77, 87, 88, 98
Diapros Canada Ltd.,
P.O. Box 28,
Toronto Dominion Centre,
Toronto, Ontario, M5K 1B8

REFERENCES
Gibbins *et al.* (1977); Mitchell (1976); Mitchell and Fritz (1973).

LOCATION
Somerset, Banks and Victoria Islands.

HISTORY
A report on a kimberlite pipe from Somerset Island by Mitchell and Fritz (1973) led to the discovery, staking and sampling of several kimberlites by Diapros Ltd. and Cominco Ltd. (Gibbins *et al.*, 1977). Several hundred tons of kimberlite yielded a few small diamonds.

DESCRIPTION
Several diatremes and dykes of kimberlite cut Lower Paleozoic carbonates. The largest, the Batty pipe(s), is more than 2,300 feet in diameter. Olivine, phlogopite, pyrope, pyroxene, magnetite and ilmenite are usually present.

CURRENT WORK AND RESULTS
Small helicopter supported field crews collected 80 lbs. stream samples for heavy mineral analyses from Somerset, Banks, Victoria and several other arctic islands.

VICTORIA ISLAND PROJECT 77 D and E
Uranerz Exploration & Mining Ltd., 70°N, 107°W
110, 7220 Fischer St. S.E.,
Calgary, Alberta.

REFERENCES
Campbell and Cecile (1975); Christie *et al.* (1972); Thorsteinsson and Tozer (1962); Young (1974); Young and Jefferson (1975).

PROPERTY
None

LOCATION
The area is in south central Victoria Island, west and northwest of Cambridge Bay and extends north from Wellington Bay to about 10 miles north of Washburn Lake. It is commonly referred to as the Wellington High or Arch.

HISTORY
A geological reconnaissance of Victoria Island was carried out by the Geological Survey of Canada in 1959 and a geological map and report for the island were published in 1962 (Thorsteinsson and Tozer, 1962). A more detailed stratigraphic and sedimentalogic investigation of the Precambrian sediments in the southern part of the Wellington High was made by Young in 1972.

DESCRIPTION
The age of the sedimentary rocks of the southern Wellington High is controversial. Thorsteinsson and Tozer (1962) considered them to be part of the Shaler Group (Hadrynian), but Christie *et al.* (1972) proposed the existence of both Aphebian and younger rocks on the basis of highly variable dips. Young (1974) considered they were of the same age, a proximal facies of the Glenelg Formation of lowest Shaler Group. Finally, Young and Jefferson (1975) suggest the Wellington High succession is correlative, at least in

part with Aphebian rocks of the Bathurst Inlet area to the south (Campbell and Cecile, 1975), and the coarse clastic rocks of the Wellington High and the westerly directed paleocurrents obtained from them (Young, 1974) suggest that the eastern margin of the Kilohigok Basin lay not far to the east. If this interpretation is valid, the Wellington High should have similar geological potential for uranium mineralization as the Bathurst Inlet area (pages 63-64).

CURRENT WORK AND RESULTS

In 1976 geologists from Uranerz Canada Ltd. mapped and prospected the southern Wellington High. The mapping located previously unreported granitic basement near Washburn Lake. A sample of syenite supplied by K. Bond of Uranerz has been analysed by the Geochronology Section of the Geological Survey of Canada. It has a typical Hudsonian age of 1,673±42 m.y. (K-Ar analysis of muscovite).

The results of the prospecting were negative; no claims were staked and no further work was done in 1977.

Work was also done in the Hadley Bay area at the north end of the Wellington Arch.

Geologists from Trigg Woollett Associates also prospected the Wellington High in 1976.

KEEWATIN REGION

P.J. Laporte

In 1976, the District Geologist, Keewatin Region, monitored mineral exploration in the mainland part of the Northwest Territories east of 106°W longitude. This area, part of the Churchill Structural Province of the Canadian Shield, is underlain by Archean and Aphebian volcanic, sedimentary, and plutonic rocks deformed and metamorphosed during the Hudsonian Orogeny. Shallow-dipping to flat-lying unmetamorphosed rocks of late Aphebian and Helikian age locally overlie the metamorphic complex south and west of Baker Lake.

In the following chapter, the Keewatin District has been subdivided into three main regions and one sub-region on the basis of geology and exploration targets (Fig. IV-1): the Ennadai Lake - Rankin Inlet Area, the Baker Lake - Thelon River Area, which includes the Yathkyed - Tulemalu Lakes sub-area, and the Chantrey Inlet - Wager Bay Area. Most of the properties in the district encompass, or are adjacent to, lakes on which fixed-wing aircraft can land.

ENNADAI LAKE - RANKIN INLET AREA

In this area, a complex of granitic gneisses, migmatites and intrusions enclose northeast-trending belts of Archean volcanic flows and pyroclastics, slate, greywacke, conglomerate and minor iron-formation. These Archean rocks are unconformably overlain by Aphebian conglomerate, greywacke, quartzite, orthoquartzite, argillite and dolomite which, to the east, are interbedded with and overlain by basaltic flows. During the Hudsonian Orogeny, the Aphebian and Archean rocks were folded about northeasterly axes and intruded by quartz monzonite and granodiorite. Fluorite-bearing granite intruded the Archean-Aphebian complex during Paleohelikian time.

Volcanogenic massive sulphide and precious metal deposits within the Archean volcano-sedimentary assemblage are the main target of mineral exploration in this area. The uranium potential of Aphebian conglomerate near Kinga Lake was also investigated in 1976.

MAGUSE LAKE - WALLACE RIVER PROJECT — Base Metals, 55 E, F
Aquitaine Company of Canada Ltd.,
2000, 540 Fifth Ave. Southwest,
Calgary, Alberta.

REFERENCES
Davidson (1970b); Laporte (1978); Wright (1967).

PROPERTY
The six prospecting permits and 68 claim groups listed in Figure IV-2 are part of the Maguse Lake - Wallace River Project.

LOCATION
The project area extends west from the shore of Hudson Bay to Ray and Carr Lakes.

HISTORY
Prospecting Permits 297 to 300 and 87 claims were acquired in 1973, Prospecting Permits 308 and 309 and 103 claims in 1974, 170 ACO claims in 1975, 501 A to U and 332 COD, COY, EGG, MC, OWL, TOM, SUN, SYN and WIN claims in 1976. Prospecting Permits 297 to 300 expired and 46 ACO claims lapsed in April, 1976. Four WAF claims lapsed in August, 1976.

DESCRIPTION
The Maguse Lake - Wallace River Project is a study of the base-metal potential of the southeastern part of the Rankin-Ennadai greenstone belt. Metamorphosed, pillowed and massive, dacitic to basaltic volcanic rocks, quartzite, shale, greywacke and magnetite iron-formation of the Kaminak Group underlie the project area. Granitoid plutons intrude the supracrustals to the west, north and southeast (Fig. IV-2).

CURRENT WORK AND RESULTS
Ten grids, covering airborne anomalies detected by the 1973 and 1974 INPUT surveys, were surveyed with the Maxmin and McPhar VHEM 660 instruments. Four of the grids, on the SAND, WET and WEZ claims and Prospecting Permit 308 had been surveyed with EM and magnetometer in 1974 and 1975. Six new grids cover two anomalies on the GAB claims, one each on ACO 39-49, ACO 160-70 and TOM 1 claims and one on Prospecting Permit 308. A geologically interesting area, the KOP claims, was also surveyed with EM instruments.

KEEWATIN PROJECT — Base Metals, Gold, 55 E,K,L; 65 H
Essex Minerals Company,
1208, 7 King Street East,
Toronto, Ontario, M5C 1A2

REFERENCES
Laporte (1978); Ridler and Shilts (1974).

PROPERTY
The claims staked for Essex Minerals Company in 1975 and the claims previously staked by Pennaroya Canada Limited are listed in Figure IV-3.

LOCATION
Four areas were staked: west of Mistake Bay; west of Snug Lake; west of Kaminak Lake, and west and northwest of Turquetil (Fig. IV-3).

HISTORY
Pennaroya Canada Ltd. explored these areas in 1969 to 1971 by geological mapping, airborne and ground EM and magnetometer surveys and diamond drilling. Essex Minerals Company explored the untested anomalies in 1975. The following claims lapsed in 1976 and 1977: 139 APE, 6 CRI, 21 DELTA, 44 DOG, 7 EPSILON, 12 GIN, 9 IT, 62 KOW, 21 PDQ, 46 PHAT, 16 RUM, 30 RYE, 25 SUE and 8 THETA.

DESCRIPTION
The claims cover outcrops of felsic and mafic volcanics of the Archean Kaminak Group.

CURRENT WORK AND RESULTS
Ground geophysical surveys and 1,928 feet (588 m) of diamond drilling tested geophysical anomalies in the Quartzite Lake area and a gold showing, previously explored by Giant Yellowknife Mines Limited, northwest of Turquetil Lake.

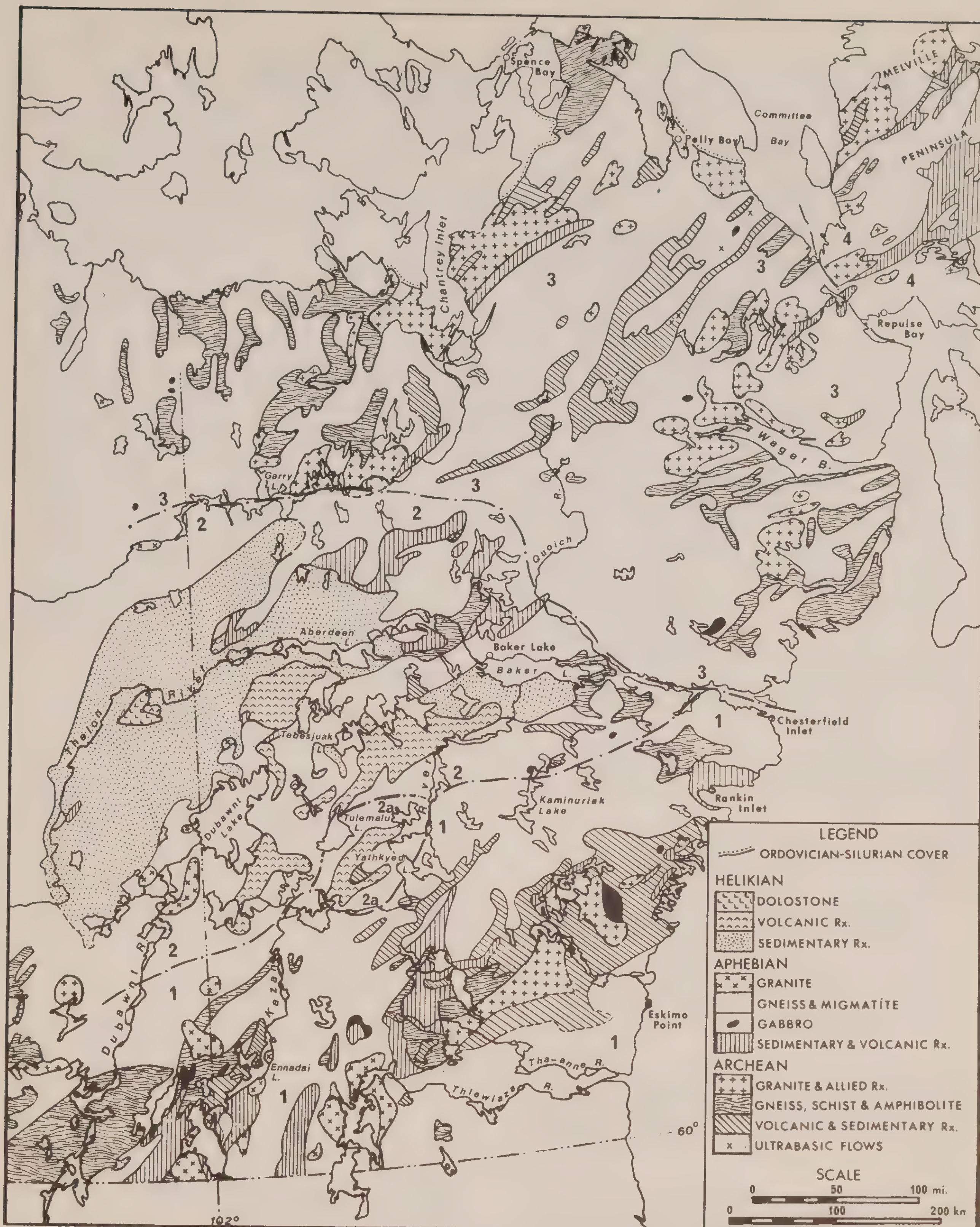


Figure IV-1: Geology map of the Keewatin Region showing subdivisions:
1. Ennadai Lake - Rankin Inlet Area
2. Baker Lake - Thelon River Area
2a. Yathkyed - Tulemalu Lakes sub-area
3. Chantrey Inlet - Wager Bay Area

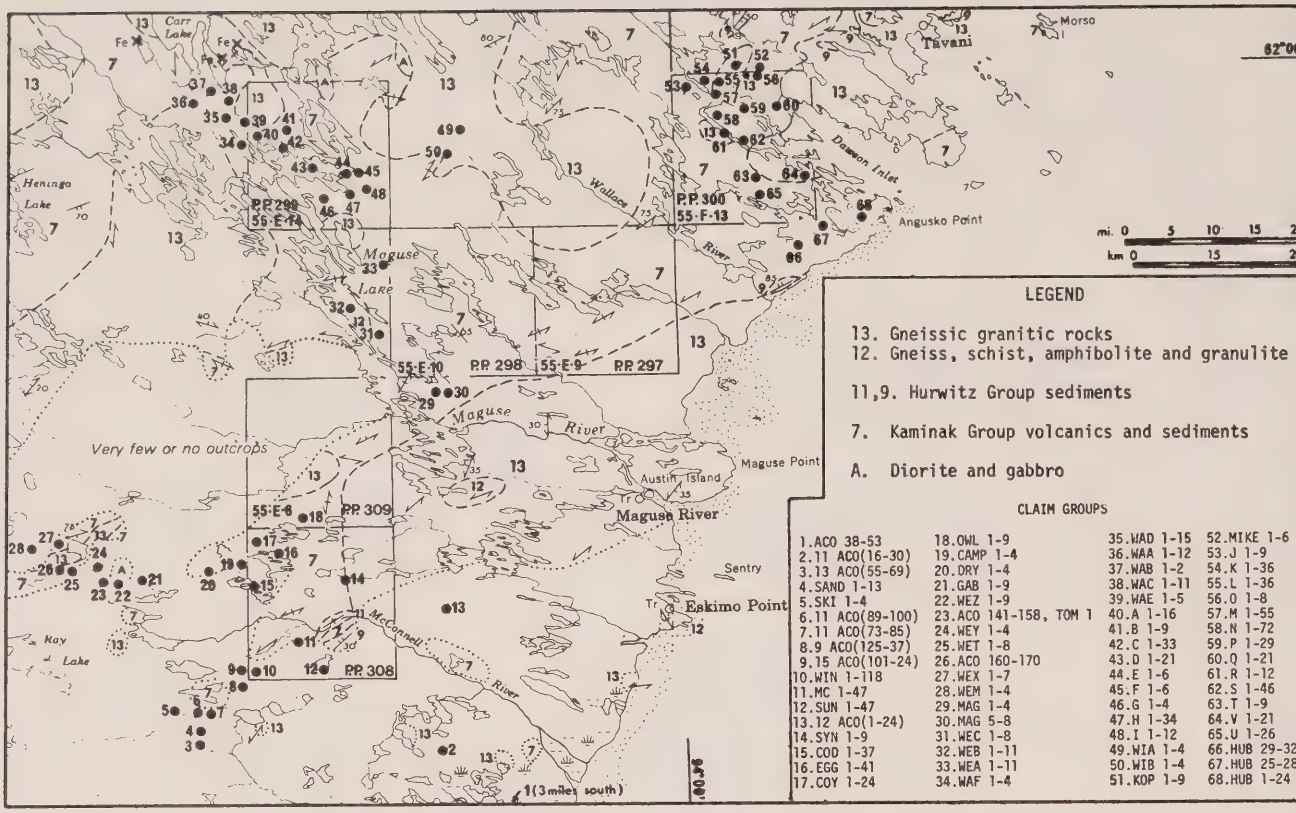


Figure IV-2: Geology of the Maguse Lake - Wallace River Area showing the location of Aquitaine Company of Canada Ltd. properties (geology from Wright, 1967).

YANDLE-KAMINAK PROJECT — Base Metals
Noranda Exploration Co. Ltd., — 55 K, L, 65 H
P.O. Box 1619,
Yellowknife, N.W.T.

REFERENCES
Laporte (1978); Ridler and Shilts (1974).

PROPERTY
The numerous claim groups held by Noranda Exploration Company Limited are listed and shown in Figure IV-3.

LOCATION
Claims have been staked to cover parts of the Kaminak greenstone belt near Maze Lake, north of Kaminak Lake and southeast of Heninga Lake (Fig. IV-3).

HISTORY
The CARP claims were staked in June, 1976 and lapsed in 1977. The other claims were staked in 1973 to 1975 and all but the following lapsed in 1976: 44 FOX, 22 INK, 8 IRMA, 27 JO, 30 LEG, 12 MID, 6 MIKE, 18 MULE, 21 NAK, 10 NIK, 8 SINK, 4 STURQ and 17 TOE.

DESCRIPTION
The Archean Kaminak Group rocks east of Yandle Lake have been divided into one incomplete and four complete mafic to felsic volcanic/sedimentary cycles (Ridler and Shilts, 1974). Most of the claim groups in the Kaminak and Heninga Lakes areas cover outcrops of felsic volcanics. The Maze Lake groups cover the eastern and northern contacts of a granitoid pluton with the volcanic assemblage.

CURRENT WORK AND RESULTS
Four holes, totalling 365 metres (1,200 ft.) were drilled in the Maze Lake and Kaminak Lake areas to test geophysical anomalies.

DEE CLAIMS — Zinc, Copper, Silver
Giant Yellowknife Mines Ltd., — 55 L/4
Yellowknife, N.W.T. — 62°04'11"N, 95°52'50"W

REFERENCES
Davidson (1970a); Padgham *et al.* (1976).

PROPERTY
44 DEE

LOCATION
The claims cover the north shore of Spi Lake, two miles (3.22 km) southeast of Carr Lake (Fig. IV-3).

HISTORY
Sixty-four DEE claims were staked in August, 1960 to cover a copper-zinc showing. Reconnaissance geological mapping and trenching in 1960 were supplemented, in 1961, by 272 line-miles (438 km) of EM and magnetic surveys, detailed geological mapping and 7,418 feet (2,261 m) of diamond drilling and, in 1972 and 1973, by a ground EM survey and 5,595 feet (1,705 m) of drilling (Padgham *et al.*, 1976).

DESCRIPTION

Massive and pillowed basaltic and andesitic volcanics underlying the northern part of the claim group are in contact, to the south, with felsic tuff, agglomerate and flow breccia and are intruded, to the east, by massive grey hornblende tonalite. Pyrite, pyrrhotite, sphalerite, chalcopyrite and galena occur in irregular northwest-trending zones within the fragmental rocks. One of the irregular pod-shaped surface showings consists of massive sulphides outcropping over an area 130 by 30 feet (40 by 9 m). Channel samples of this zone averaged 10.65% Zn, 0.72% Cu and 0.39 oz/ton Ag over 25 feet (7.6 m). A hole, drilled in 1961, to test this showing intersected a four-foot (1.2 m) section of disseminated chalcopyrite assaying 1.92% copper.

Two other mineralized zones were found by the 1961 diamond drilling. The southerly zone, under the west arm of the lake, was intersected in three holes and has a strike length of approximately 700 feet (200 m). The second zone, 1,200 feet (366 m) to the northwest, has a strike length of 600 feet (183 m) and was intersected in four holes. The best intersections were:

	Hole No.	Width ft/*m*	Au oz/ton	Ag oz/ton	Cu%	Zn%
Southerly Zone	6	14/ *4.27*	0.025	0.68	0.10	4.25
	7	12/ *3.66*	-	-	-	1.35
	14	39/*11.89*	tr.	0.21	0.07	2.26
		10/ *3.05*	0.005	0.92	0.04	2.30
	16	6/ *1.83*	0.017	1.37	5.05	-
North Zone	10	26/ *7.92*	tr.	0.23	0.03	1.26
		11/ *3.35*	tr.	0.49	0.03	3.11

CURRENT WORK AND RESULTS

Cominco Ltd. mapped and surveyed the claims with EM and magnetometer.

DEN CLAIMS
Dr. S.M. Roscoe
under option to:
Western Mines Ltd.,
1414 - 390, Bay Street,
Toronto, Ontario.

Uranium
65 H/10, 15
61°45'N, 96°45'W

REFERENCES

Bell (1970); Laporte (1974 a).

PROPERTY

166 DEN

LOCATION

The north-northeast trending claim group (Fig. IV-4) is centered 12 miles (19 km) south-southwest of Kinga Lake and 12 miles (19 km) west-northwest of Harling Lake.

HISTORY

The DEN claims, staked in 1969, were explored in 1969 and 1970 by Denison Mines Ltd. (Laporte, 1974a). Detailed geological mapping, airborne and ground radiometric surveys, a soil radon survey and a reconnaissance VLF-EM survey were used to outline radioactive conglomerate beds in the Montgomery Lake sediments. Six holes, totalling 2,102 feet (640.7 m) were drilled into the base of the Montgomery Lake sequence and intersected pyritic conglomerate beds, one of which contained 0.017% U_3O_8 over twelve feet (3.7 m) (Fig. IV-4).

DESCRIPTION

Aphebian Montgomery Lake quartz arenite, grit, siltstone, quartz-pebble conglomerate and minor arkose and polymict conglomerate outcrop along the eastern edge of two west plunging synclinoriums and on the eastern limb of a north-plunging synclinorium southwest of Kinga Lake (Fig. IV-4). Hurwitz Group, Padlei Formation polymict boulder to pebbly conglomerate, pebbly mudstone, laminated siltstone, mudstone and minor arkose overlie, locally with structural disconformity, Montgomery Lake sedimentary rocks and are overlain by coarse- to fine-grained quartz arenites of the Kinga Formation. The Montgomery Lake rocks, on the DEN claims, unconformably overlie pillowed and massive andesite and basalt of the Archean Kaminak Group.

The 1970 drilling (Fig. IV-4) and detailed mapping indicate that Montgomery Lake rocks southeast of Kinga Lake are underlain by lapilli tuff and fine agglomerate which grade into quartzose waterlain volcaniclastics, quartzose greywacke with thin layers of argillite and crossbedded quartzite. The next 900 feet of section were not explored and are overlain by 750 feet (229 m) of fine to medium-grained crossbedded siliceous quartzite similar to the quartzite associated with the volcaniclastics. Tightly packed, pyritic, radioactive polymictic conglomerate 75 feet (23 m) thick (Fig. IV-4) overlies an erosion surface on top of the quartzite and contains 0.004% U_3O_8 over four feet (1.2 m). The polymict conglomerate is overlain by 1,000 feet (305 m) of medium to coarse-grained greenish sericitic to feldspathic quartzite with intercalated layers of quartz grit, small pebble conglomerate and siltstone (Fig. IV-4). One of the five pyritic and radioactive conglomerate beds intersected in hole 1A contained 0.025% U_3O_8 over 1 foot (0.3 m) and second contained 0.017% U_3O_8 over 12 feet (3.7 m). Outcropping northwest of holes 1 and 1A are 500 feet (152 m) of coarse quartzite and grit containing two zones of radioactive quartz-pebble conglomerate. This coarse quartzite grades vertically into 1,500 feet (427 m) of fine-grained quartzite which is unconformably overlain by the Padlei Formation.

CURRENT WORK AND RESULTS

Detailed mapping, petrographic and geochemical studies and prospecting with gamma-ray spectrometers were done. The uranium, thorium and gold content of soils, uranium content of water and stream and lake sediments and radon content of soils and surface waters were determined. Detailed mapping of two areas where the contact between Montgomery Lake and Kaminak Group rocks are exposed and a petrographic study of the various rock types indicates that the polymict conglomerate is a locally derived basal till overlying quartzose acid tuffite of the Kaminak Group. The overlying quartzitic sediments contain drop stones up to six inches (15 cm) in diameter and were possibly deposited as alluvial fans or from turbidity currents in a lacustrine environment. The restricted distribution of the uraniferous conglomerate indicates that the coarser sediments and heavy minerals entered the basin of deposition during specific, brief periods of flooding caused by increased glacial melting or rainfall.

The exposure at the west-central edge of the DEN claims, mapped by Bell (1970) as Padlei Formation conglomerate, is interpreted by Western Mines Ltd. geologists, as basal Montgomery Lake tillite and the lithological similarity between the fine-grained grey quartzite in the uppermost Montgomery Lake sequence and the grey quartzite interbedded with the Padlei

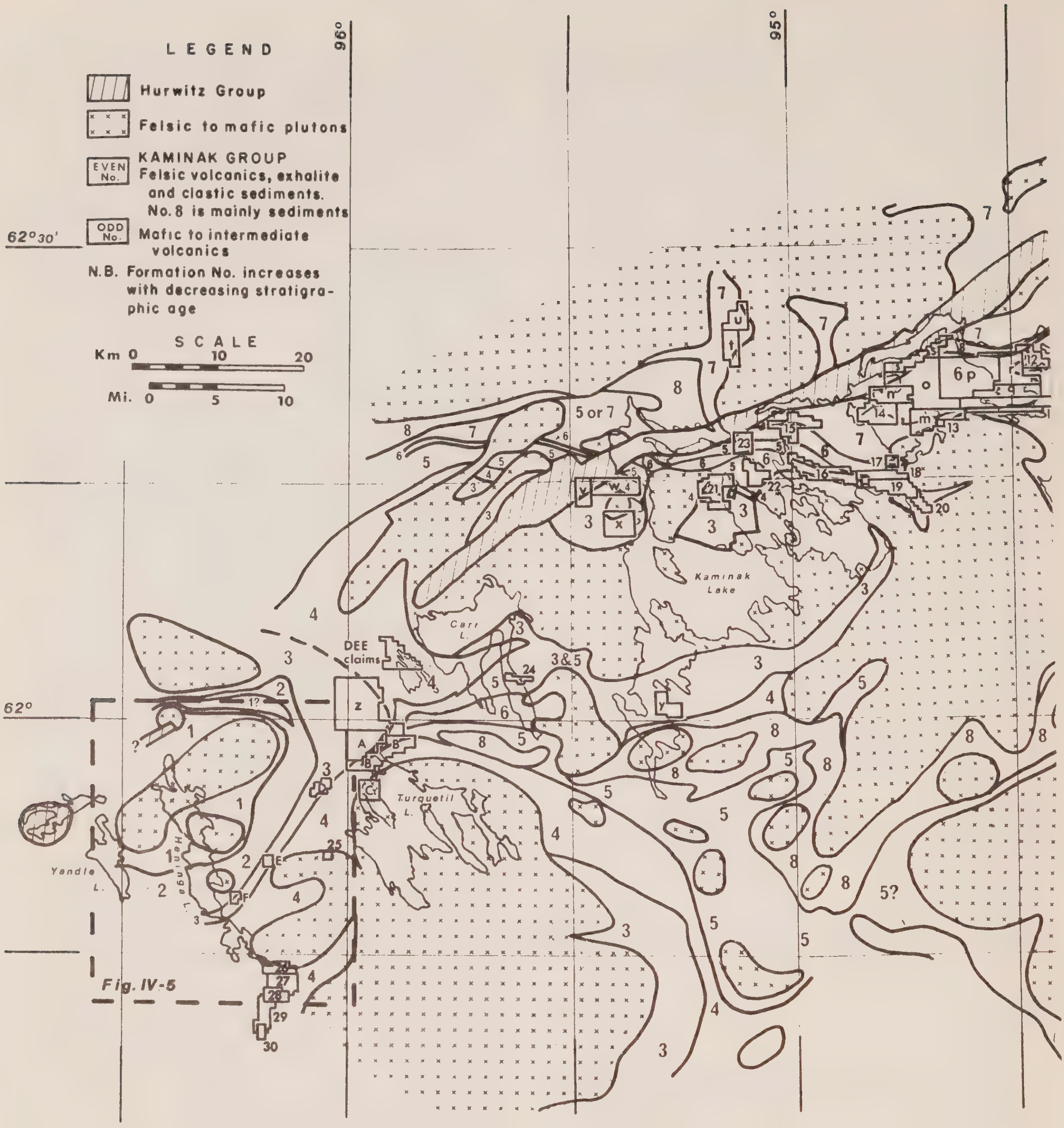
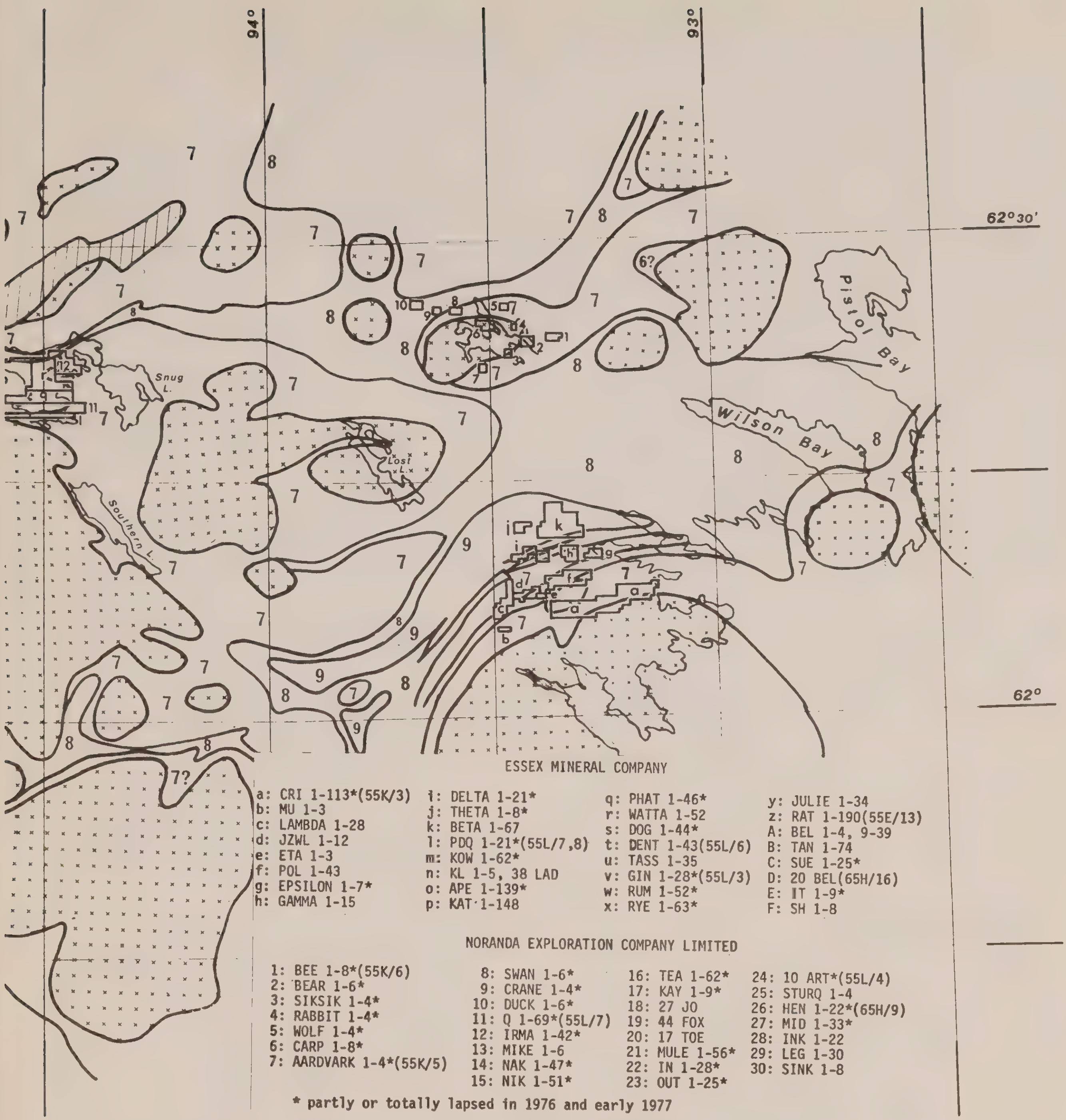


Figure IV-3: Geology of the Kaminak Lake Area showing the location of Essex Minerals Company, Noranda Exploration Company Limited and Giant Yellowknife Mines Ltd. (DEE Claims) properties (geology from Ridler and Shilts, 1974).


94°
93°
62°30'
62°
Pistol Bay
Wilson Bay
Snug L.
Lost L.
Southern L.
ESSEX MINERAL COMPANY
a: CRI 1-113*(55K/3)
b: MU 1-3
c: LAMBDA 1-28
d: JZWL 1-12
e: ETA 1-3
f: POL 1-43
g: EPSILON 1-7*
h: GAMMA 1-15
i: DELTA 1-21*
j: THETA 1-8*
k: BETA 1-67
l: PDQ 1-21*(55L/7,8)
m: KOW 1-62*
n: KL 1-5, 38 LAD
o: APE 1-139*
p: KAT 1-148
q: PHAT 1-46*
r: WATTA 1-52
s: DOG 1-44*
t: DENT 1-43(55L/6)
u: TASS 1-35
v: GIN 1-28*(55L/3)
w: RUM 1-52*
x: RYE 1-63*
y: JULIE 1-34
z: RAT 1-190(55E/13)
A: BEL 1-4, 9-39
B: TAN 1-74
C: SUE 1-25*
D: 20 BEL(65H/16)
E: IT 1-9*
F: SH 1-8
NORANDA EXPLORATION COMPANY LIMITED
1: BEE 1-8*(55K/6)
2: BEAR 1-6*
3: SIKSIK 1-4*
4: RABBIT 1-4*
5: WOLF 1-4*
6: CARP 1-8*
7: AARDVARK 1-4*(55K/5)
8: SWAN 1-6*
9: CRANE 1-4*
10: DUCK 1-6*
11: Q 1-69*(55L/7)
12: IRMA 1-42*
13: MIKE 1-6
14: NAK 1-47*
15: NIK 1-51*
16: TEA 1-62*
17: KAY 1-9*
18: 27 JO
19: 44 FOX
20: 17 TOE
21: MULE 1-56*
22: IN 1-28*
23: OUT 1-25*
24: 10 ART*(55L/4)
25: STURQ 1-4
26: HEN 1-22*(65H/9)
27: MID 1-33*
28: INK 1-22
29: LEG 1-30
30: SINK 1-8
* partly or totally lapsed in 1976 and early 1977

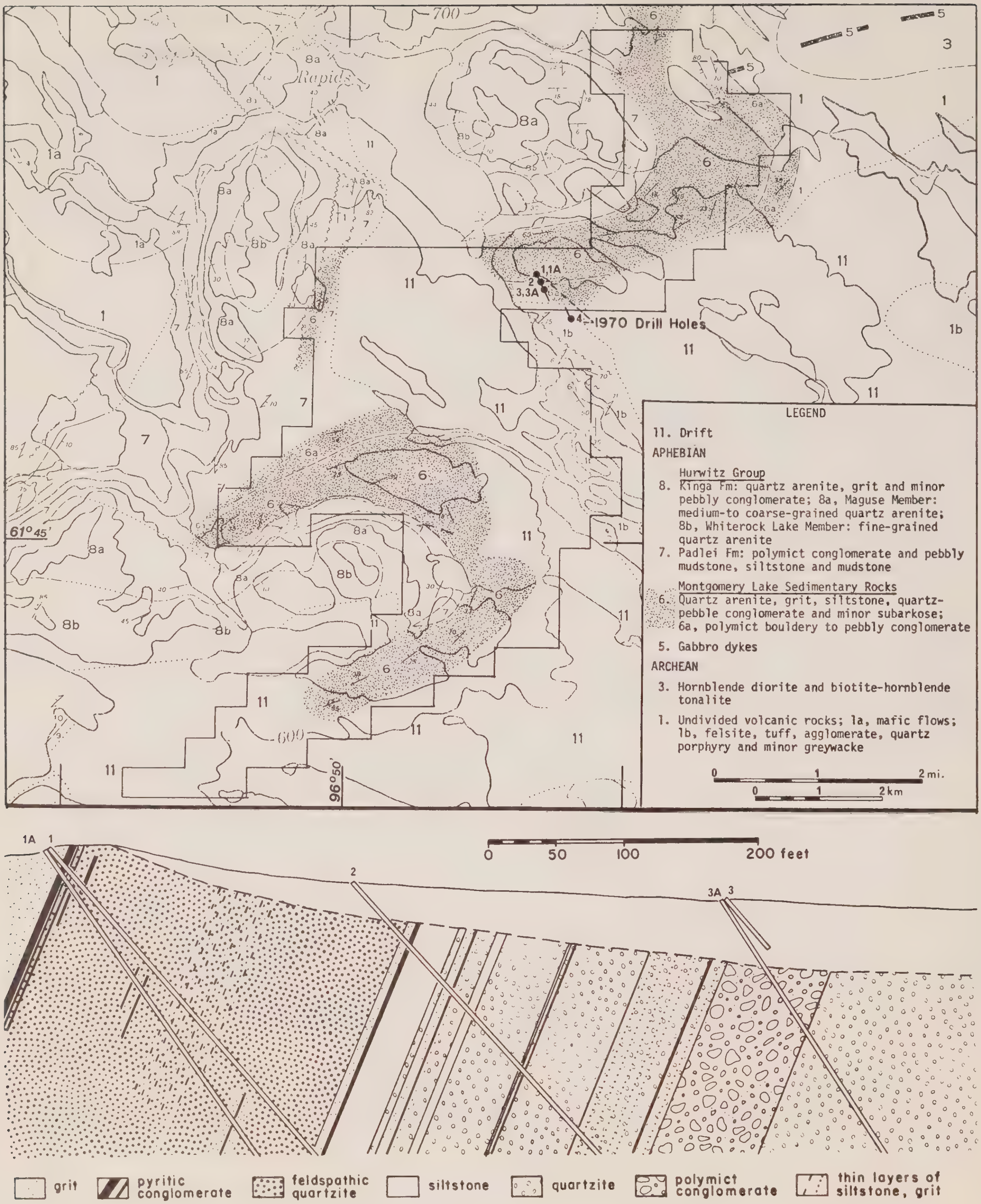


Figure IV-4: Geology of the Kinga Lake Area showing the location of the DEN claims, the 1970 drill holes and a cross-section across the northernmost five holes (geology from Bell, 1970).

Formation siltstones suggests overlap with local interformational diastems separating the two rock groups rather than a pronounced unconformity. The Padlei Formation is similar to the Montgomery Lake sequence in that it has an initial glacial event and terminates in red-bed lithologies.

The radioactive minerals in the pyritic quartz-pebble conglomerates of the Montgomery Lake sequence are disseminated fine-grained uranothorite, a titania complex (brannerite?) and zircon. That they were derived from the felsic and silicic pyroclastics of the Kaminak Group is suggested by their microscopic size and the presence of considerable chlorite in the matrix of the conglomerate. The Montgomery Lake conglomerates differ from those of Elliot Lake and the Witwatersrand in that:

(a) the basal polymictic conglomerate has no lithological similarity to the uraniferous conglomerates;

(b) the conglomerate may be beach or turbidity deposits of considerable lateral extent rather than channel-fill deposits;

(c) the matrix is chloritic;

(d) there is no evidence of hydrocarbons.

HENINGA LAKE PROJECT	Zinc, Copper, Silver
St. Joseph Explorations Ltd.,	65 H/16
90, Eglington Avenue West,	61°47'N, 96°13'W
Toronto, Ontario, M4R 2E4	

REFERENCES
Bell (1971); Laporte (1978); Laporte *et al.* (in prep.).

PROPERTY
The claims optioned from Thomas Skimming and Associates and Gemex Minerals Incorporated and those staked for St. Joseph Explorations Limited are listed in Figure IV-5.

LOCATION
Most of the claims are part of a four- to six-mile (6 to 10 km) wide and ten-mile (16 km) long group trending east across the south end of Heninga Lake (Fig. IV-5). The LEO and CERT claims are four and six miles (6 and 10 km) northwest of Heninga Lake.

HISTORY
The SKIM claims were staked in July, 1972 to cover ground previously held as the TOWER group and explored by Hudson Bay Mining and Smelting Company Ltd. from 1946 to 1948. The DON, MIKE and JOHN claims were staked in late 1974, most of the other claims in the summer and fall of 1975 and the BET, BOB, QUAN and WALL claims in 1976. The following claims lapsed in 1976: 20 BAR, 10 BOX, 12 CERT, 4 COD, 7 DOT, 3 FOX, 64 LEO, 16 PAD, 36 PAW, 36 SHOW, 87 SUN, 23 TENT, 40 TIE, 20 TIP and 24 WOLF.

DESCRIPTION
The main block of claims is underlain by east to northeast-trending felsic volcanic breccia, lapilli tuff and tuff of the Archean Kaminak Group intruded by mafic sills or dykes and northeast-trending Aphebian glomeroporphyrytic diabase dykes. Hornblende tonalite underlies the southeastern corner of the claim group. Three copper-zinc-silver showings are in a pyritic felsic pyroclastic zone extending 3,000 feet (914 m) northeast from the centre of Heninga Lake (Laporte, 1978).

The LEO and CERT claims cover pillowed volcanics and agglomerate of the Kaminak Group.

CURRENT WORK AND RESULTS
Ground EM surveys, totalling 111 line-kilometres (69 miles) over 13 anomalies detected by the 1975 Questor INPUT survey, outlined 16 conductors; 15 have weak to strong in-phase and out of phase response. Nine holes, totalling 938.39 metres (3,078.7 ft.) tested nine of the geophysical conductors. Three conductors were caused by cherty magnetite iron-formation in tuffs; one by pyrrhotite and pyrite in brecciated rhyolite; one by pyrite, pyrrhotite, minor chalcopyrite and graphite in a rhyolite flow, and one by graphitic and pyritic metasediments in felsic tuff. On TENT 20, 5.06 metres (16.6 ft.) of graphitic carbonate-rich slate interbedded with felsic tuff and lapilli tuff contained 0.10% Cu and 0.86% Zn; 1.7 metres (5.6 ft.) of this section contained 0.24% Cu and 2.32% Zn. On TOE 4, graphitic slate in mafic flows and tuffs contained 0.34% Zn over 0.95 metres (3.1 ft.). The hole drilled on PIT 4 intersected 28.02 metres of lapilli tuff which contained 0.05% Cu and 1.74% Zn in pyrite, sphalerite and chalcopyrite stringers; a one metre (3.3 ft.) sample contained 0.29% Cu and 4.69% Zn.

Three holes, totalling 316.09 metres (1,037 ft.) were drilled on anomalies surveyed in 1975. One hole on DON 10 intersected magnetite iron formation, one on MAG 31 intersected minor sphalerite and chalcopyrite disseminations, blebs and stringers in felsic tuff and the hole on MAG 33 intersected barren fracture zones in lapilli tuff.

Five holes totalling 795.86 metres were drilled into the main sulphide-bearing pyroclastic unit. On the SKIM claims three holes probed the down-dip and western extensions of the west copper-rich zone and two holes were east of the central zone (Laporte, 1978). The results of this drilling are tabulated below.

AN AND F-13 CLAIMS	Gold, Silver, Copper
Noranda Exploration Company Ltd.	65 J/4, 5
P.O. Box 1619,	
Yellowknife, N.W.T.	

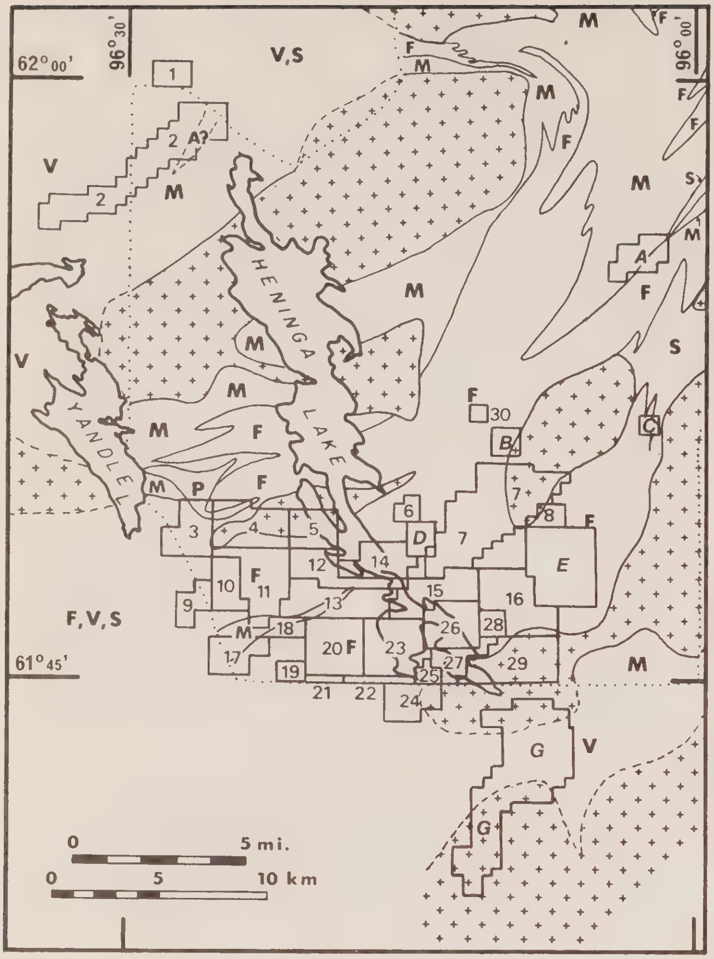
REFERENCE
Eade and Blake (1977)

PROPERTY

F-13	1-12	65 J/4
AN	1-21	65 J/4, 5

LOCATION
The AN claims cover the central northwestern shore of Angikuni Lake and the F-13 claim, the northwest shore of a large island in the south-central part of the lake.

HISTORY
The Angikuni Lake area was held as Prospecting Permits 39 and 40, issued in 1964 and relinquished in 1965, by Canadian Nickel Company Ltd. They staked the NICO 1-50 claims, in 1963, over ground restaked in 1976 as the F-13 claims. In 1964, the permits were mapped at a scale of 1:63,360. The NICO claims were surveyed with a magnetometer and EM S-250 unit and the Robin Showing, east of the north part of Angikuni Lake, was surveyed with a magnetometer. Nine holes, totalling 1,866 feet (568.8 m) were drilled, four on the NICO claims, one on Big Island east of the NICO claims, two on the Robin Showing, and one each on the Vuori Galena Showing, in the AN claims area, and



LEGEND

APHEBIAN
A. Quartzitic sediments and basalt flows

ARCHEAN
+ + + Granitic and gabbroic intrusions
S. Greywacke and slate, volcanic pebble conglomerate, carbonate and oxide iron-formation
P. Quartz-feldspar porphyry
F. Intermediate to felsic pyroclastics, minor felsic flows, porphyrytic intermediate flows and sediments (S)
V. Mafic flows with some intercalated felsic flows and tuffs
M. Massive or pillowed basaltic and andesitic volcanics, some mafic pyroclastics

..... Limits of I.A.N.D. mapping (Laporte et al, in prep.)

CLAIM GROUPS

St. Joseph Explorations Limited

1. CERT 1-12
2. LEO 1-72
3. 24 WOLF
4. PAW 1-36
5. TIP 5-14, 23-32
6. ATE 1-8
7. SUN 1-87
8. QUAN 1-7
9. JOE 1-16
10. 16 PAD
11. SHOW 1-36
12. BAR 5-14, 23-36
13. TENT 1-36
14. RAP 1-25
15. JOHN 1-30
16. MIKE 1-34
17. FOX 1-20
18. TOE 1-10
19. DEN 1-6
20. BOX 1-36
21. COD 7-10
22. DOT 1-7
23. DON 1-36
24. BOB 1-16
25. BOG 5-7, PIT 1-5
26. 29 SKIM
27. WALL 1-17
28. BET 1-9
29. 42 TIE
30. FORE 1-4

Others

A. 20 BEL Essex Minerals Company
B. IT 1-9 Essex Minerals Company
C. STURQ 1-4 Noranda Exploration Company Limited
D. SH 1-8 Essex Minerals Company
E. MAG 1-53 Hudson Bay Exploration and Development Co. Ltd.
G. HEN, MID, INK, LEG, SINK Noranda Exploration Company Limited

Figure IV-5: Geology of the Heninga Lake area showing the location of claim groups (geology from Laporte *et al.*, in prep.)

RESULTS OF 1976 DRILLING ON THE SKIM CLAIMS

Hole No.	Location	Intersection (metres)	Description	Length (metres)	% Cu	% Zn	Ag oz/t
H.1.76	West Zone under westernmost 1975 hole	131.51 - 152.83	Stringer sulphides in tuff	21.32	-	-	-
		150.31 - 150.81	best intersection	0.5	5.39	0.05	-
		162.89 - 174.43	massive to semi-massive sulphides	10.54	2.46	5.41	-
		168.56 - 170.00	best intersection	1.44	8.37	16.4	3.26
H.2.76	West Zone 200' east of H.1.76	87.00 - 153.59	stringer sulphides in tuff	66.59	-	-	-
		98.34 - 99.34	best intersection	1.0	2.01	0.02	-
		156.35 - 157.14	massive sulphides	0.79	6.61	10.45	3.61
H.3.76	West Zone 200' west of H.1.76	99.00 - 103.72	stringer sulphides in tuff	4.72	-	-	-
		100.00 - 101.00	best intersection	1.0	0.02	3.63	-
		146.42 - 154.00	stringer sulphides	7.58	0.79	0.14	-
		153.42 - 154.00	best intersection	0.58	3.0	0.09	1.18
		154.00 - 158.30	massive sulphides	4.30	4.37	6.63	1.74
		157.15 - 158.30	best intersection	1.15	2.34	19.0	1.38
H.4.76	Central Zone 50' east of 1974 drilling	15.00 - 16.55	stringer sulphides	1.55	tr.	2.95	-
		44.05 - 85.49	disseminated pyrite	41.44	-	-	-
		67.66 - 68.87	best intersection	1.21	0.48	0.04	0.44
		101.05 - 107.05	disseminated sulphides	6.0	-	-	-
		102.55 - 104.05	best intersection	1.50	0.03	1.87	-
H.5.76	200' east of H.4.76	88.78 - 97.65	thin pyrite streaks	8.87	-	-	-
		96.50 - 97.65	best intersection	1.15	-	0.05	-

on the Hank's Point Showing southwest of the AN claims.

DESCRIPTION

North-trending metavolcanics, metasediments and minor gabbro and amphibolite outcrop at the west end of Big Island and along the west shore of Angikuni Lake within gneissic granodiorite.

Drilling on the NICO claims intersected rhyolite and intermediate volcanics with numerous carbonate zones. The hole drilled on the Vuori Galena Showing cut rusty-weathering carbonate containing disseminated galena, chalcopyrite, sphalerite and pyrite.

CURRENT WORK AND RESULTS

Geological mapping of the AN claims indicate they are underlain by rhyolite breccia and tuffs enclosing carbonate zones. The volcanoclastics rocks are in fault contact, to the west, with arkoses, phyllites and slate, and are altered to migmatite, to the east, by a granitoid intrusion. Grab samples of a carbonate-rich zone with trace pyrite and chalcopyrite contained as much as 2.08 oz/ton Au, 45.53 oz/ton Ag, 6.88% Cu and minor lead and zinc. An INPUT EM and magnetometer survey flown in October, 1976 and ground magnetometer, VLF-EM and vertical-loop EM surveys did not outline any anomalies associated with the showing.

Geological mapping at 1:1,250 and trenching indicate the F-13 claims are underlain by metamorphosed felsic lapilli tuff and agglomerate cut by a brecciated lamprophyre dyke and pyrite- and carbonate-bearing carbonate-filled fractures. Selected samples of the carbonate material contained up to 4.90 oz/ton Au, 1.18 oz/ton Ag and 17.6% Cu. Two VLF-EM surveys, a magnetometer survey and an airborne INPUT and magnetometer survey found one anomaly 400 metres (1,312 ft.) long associated with the mineralized fracture zone and one zone of weak conductively associated with minor, discontinuous copper concentrations.

BAKER LAKE - THELON RIVER AREA

The Baker Lake - Thelon River Area is underlain by a complex of gneisses and gneissic to massive granitic intrusions enclosing Archean volcanics to the south and Aphebian metasediments, with minor volcanic flows, to the northwest. Late Aphebian to early Helikian shallow-dipping conglomerates and arkosic sandstone and mudstone intruded by syenitic bodies and overlain by intermediate to felsic volcanic flows and pyroclastics cover the basement complex south and southwest of Baker Lake. Flat lying quartzose conglomerates and sandstones of Paleohelikian age overlie the basement complex in the Thelon River area west of Baker Lake.

Uranium in the basement complex, Aphebian sediments and late Aphebian to early Helikian sediments are the targets of exploration in the area. The edge of the basin of Paleohelikian quartzose conglomerate and sandstones and the northernmost belt of Aphebian metasediments were the focus of exploration in 1976.

BL AND TMT PROJECTS
Pan Ocean Oil Limited,
under option to
Cominco Limited,
120 Adelaide Street West,
Toronto, Ontario,
M5H 1T1

Uranium
55 M, 56 D, 65 P
63°47'N, 95°45'W

REFERENCES

Donaldson (1965); Laporte (1974a, b, 1978); Le Cheminant *et al.* (1976, 1977); Wright (1967).

PROPERTY

The 11 Prospecting Permits and 35 claim groups of the BL and TMT Projects are listed in Figure IV-6.

LOCATION

The prospecting permits and claim groups cover the east end of Baker Lake and extend west, south of Baker Lake, to southeast of Princess Mary Lake.

HISTORY

On January 15, 1975, Cominco Ltd. entered into a joint venture, as operator, with Pan Ocean Oil Limited on the 11 prospecting permits and 895 claims of the BL and TMT Projects. Nine of the permits were acquired in 1974 and lapsed in 1977 and two, Prospecting Permits 347 and 348, were acquired in 1975. Of the 835 claims retained after 1975, the following 107 lapsed in 1976 and 1977: 44 of the TM 138-225, 10 of the TM 233-255 and the TM 261-69, TM 271-73, K 311-12, K 314-35, K 337-48 and K 355-59 claims (Fig. IV-6). The 2185 A, B, BA, C, CA, D, DA, E, F, FOG, G, H and PITA claims were staked in 1976.

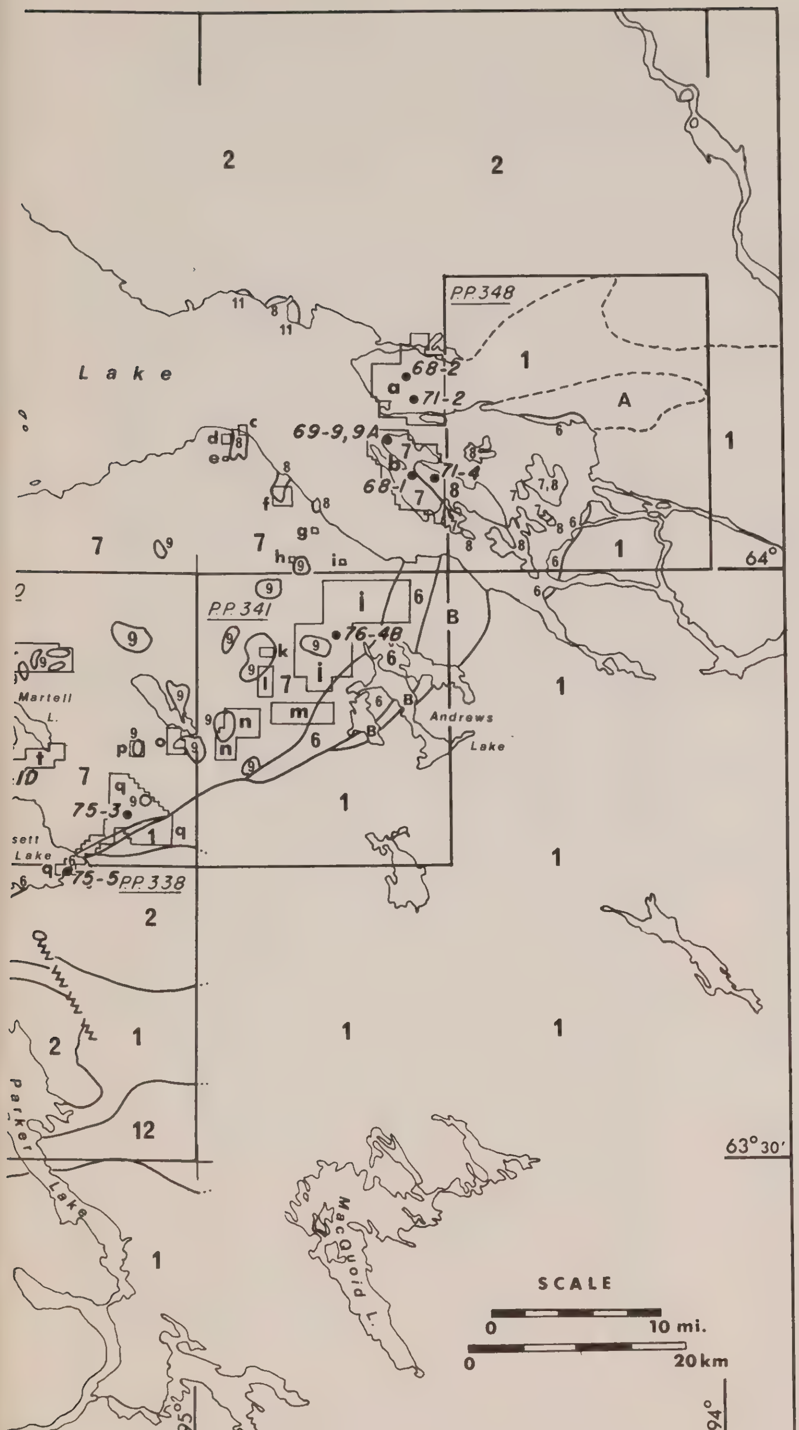
DESCRIPTION

The BL and TMT Projects explored the east end and part of the southern section of a basin of Helikian Dubawnt Group sedimentary and volcanics rocks trending west-southwest from Baker Lake. The basement complex underlying the Dubawnt Group rocks includes gneissic quartz monzonite and granodiorite, layered granodiorite gneiss, migmatite and, south and east of the Kazan River, amphibolite, paragneiss, schist and oxide iron-formation. The basal South Channel Formation polymictic conglomerate unconformably overlies the basement complex west of Andrews Lake, north of Bisset Lake and north of Thirty Mile Lake. The conglomerate grades into interbedded alluvial and aeolian arkosic sandstones and siltstones of the Kazan Formation which outcrop west and east of the Kazan River, north of Kazan Falls, and on Christopher Island at the east end of Baker Lake. The Christopher Island Formation volcaniclastics and porphyrytic andesite to trachyte flows lie, locally unconformably, on the preceding formations. Syenite plugs intruding the Kazan Formation and the basement complex south of Thirty Mile Lake are genetically related to the Christopher Island Formation flows. Two porphyrytic flows of the Pitz Formation overlie the Christopher Island Formation flows west and north of Pitz Lake. Thelon Formation sandstone and conglomerate were deposited in fluvial valleys cut into the volcanics. Northwest-trending diabase dykes of the Mackenzie Dyke Swarm intrude all the rocks in the area.

Four types of uranium showings occur in the area:

1. pitchblende-bearing fractures in basement gneiss (Showings 68-4, 4A)
2. pitchblende disseminations and veinlets in the brecciated cores of felsite dykes (Showing 68-2) and brecciated gneiss cemented by lamprophyre (Showing 71-2)
3. pitchblende-bearing fractures in Christopher Island Formation volcanics, dykes and sills (Showings 69-9A, 71-5)
4. uranium disseminations in South Channel Formation conflomerate (Showing 75-5) and Kazan Formation arkoses (Showings 68-1, 69-9, 71-4, 74-1E, 74-1W, 75-3 and 75-6) at their contact with Christopher

Figure IV-6: Geology of the Baker Lake Area showing the location of Pan Ocean Oil Limited properties (geology from Le Cheminant *et al.*, 1976, 1977 and Wright, 1967).



LEGEND

HELIKIAN

Gabbroic diabase dyke

PALEOHELIKIAN

12. Granite

Dubawnt Group

11. Thelon Formation: sandstone, conglomerate
10. Pitz Formation: quartz-feldspar porphyry
9. Alkalic intrusions, includes Martell Syenite
8. Christopher Island Formation: volcanics and volcanoclastic sediments
7. Kazan Formation: arkose
6. South Channel Formation: conglomerate

APHEBIAN AND ARCHEAN

5. Orthoquartzite, minor slate, argillite, conglomerate and impure quartzite
4. Volcanics: in part interlayered with 3 & 5
3. Schist, phyllite, greywacke, argillite
2. Gneissic quartz monzonite and granodiorite, augen gneiss, migmatite and granulite
1. Layered granodiorite gneiss, migmatite and, east of the diabase dyke, amphibolite, quartzofeldspathic paragneiss, garnet-biotite schist and oxide iron-formation

A. Anorthosite

B. Gabbro, metagabbro

CLAIM GROUPS

a. 223 BL (200-450)
b. 193 BL (1-200)
c. FOG 1-4
d. FOG 6-8
e. FOG 27
f. FOG 9-24
g. FOG 28
h. FOG 25
i. FOG 26
j. D 1-294, DA 1-15
k. D 295, DA 16-20
l. D 296, DA 21-37
m. D 297-348
n. DA 38-102
o. C 200-205, CA 1-12
p. CA 13-21
q. A 1-8, C 34-199
r. CA 22-264
s. CA 265-274
t. C 30-33, PITA 1-150
u. BIS 2-20
v. TM 261-69, 271-73
w. 10 TM (233-255)
x. BA 1-12
y. K 265-291, 294-309
z. 36 K (311-48)
A. B 1-450, K 231-64
B. K 355-59
C. 62 TM (138-255)
D. 6 AXE, 1 CAN, 5 FIRE, 21 JET, 20 KEN, 21 LAURINE, 3 LIZ, 5 MAC, 7 PEG, 15 PIC, 15 RAT, 2 SOB, 9 ZAP
E. TM 31-98
F. E 1-95, I 1-4
G. E 96-148, F 1-3
H. F 4-8, H 1-3
J. G 1-24

Island Formation volcanics, diabase dykes or feeder dykes for the volcanics.

A summary of the geology and results of exploration of the first three types of showings and a detailed description of the fourth type of showings is given in Laporte (1978).

CURRENT WORK AND RESULTS

Exploration in 1976 included:

- mapping and prospecting of the Kazan Formation outcrops at a scale of 1:10,000;
- mapping of the islands in Baker Lake and the mainland portion of Prospecting Permit 348 at a scale of 1:20,000;
- mapping of showing 68-4 at a scale of 1:6,000;
- mapping of showings 69-9A, 74-1W and 75-6 at a scale of 1:1,000;
- mapping of showing 76-9W at a scale of 1:500;
- establishment of a 1,000 - 2,400-metre (3,280 to 7,874 ft.) wide and 4,900-metre (16,076 ft.) long grid covering showings 74-1E, 74-1W and 75-6 and surveying of parts of the grid with spectrometer, magnetometer, VLF EM and IP equipment;
- the burial of approximately 350 track-etch cups near showing 74-1W for 25 days;
- the burial, for retreival in the spring, of 150 cups at showing 75-6 and of an unspecified number of cups on radon anomalies detected near showing 74-1W;
- the collection of 350 soil samples near showing 74-1W and the determination of their uranium, copper and lead content;
- the collection of water samples from 1,650 lakes on Prospecting Permits 339, 340, 341 and 348 and the determination of their uranium and, for one out of four samples, their major element content;
- 4,503 feet (1,373 m) of drilling in 11 holes on showing 74-1W, two holes on showing 75-6 and two holes on showing 76-9W.

The Kazan Formation was subdivided into eight facies by Cominco geologists. The distribution of sedimentary features: ripple-marks, planar and trough cross-stratification, erosional channels, conglomerate and siltstone lenses and dessication marks, indicate deposition in a fluvial environment.

Twenty-six radioactive outcrops or areas of frost-heaved boulders were discovered in 1976: eleven are in Kazan Formation sandstones intruded by a feeder dyke or overlain by flows of the Christopher Island Formation, nine are in sandstones, five are in feeder dykes, flows or volcaniclastics of the Christopher Island Formation and one is in a pegmatite in the basement complex. All but four of the occurrences are less than 100 square metres (1,000 sq. ft.) in area and contain less than 200 PPM U_3O_8.

Showing 76-1D is the northernmost of four occurrences along a 300-metre length (980 ft.) of a northeast-trending Christopher Island biotite lamprophyre dyke intruding Kazan Formation sandstone. Mineralized boulders are found in a 30 by 5 metres (98 x 16 ft.) area. Of the fourteen samples collected, one contained 5,600 PPM U_3O_8 and 7,300 PPM copper, one contained 345 PPM U_3O_8 and the others contained less than 6 PPM U_3O_8.

At showing 76-2 uranium occurs in a biotite-alkali feldspar pegmatite cutting amphibolite gneiss. A 10 by 10 metre (33 x 33 ft.) area measured over 100,000 counts per minute on the McPhar TV-1 scintillometer.

Showing 76-4B is one of the three areas in a 200-metre (656 ft.) long east-trending zone of Kazan Formation sandstone outcrop and frost-heaved blocks displaying anomalous radioactivity. Uranium is in bleached blocks of sandstone in an area 25 by 25 metres (80 x 80 ft.). One of thirteen samples contained 2,200 PPM U_3O_8 and the others contained less than 100 PPM U_3O_8.

Showing 76-9W was discovered by the Geological Survey of Canada mapping crews in 1975 (Le Cheminant *et al.* 1976) in an area underlain by potassic andesitic to rhyolitic feldspar-pyroxene porphyry flows, biotite-feldspar-pyroxene flows, tuffs and agglomerates of the Christopher Island Formation. Enhanced radioactivity occurs in narrow fractures in chloritised flow rocks. Radiometric readings indicate that the fractures contain less than 0.025% U_3O_8. Uranium minerals, pyrite, chalcopyrite and galena also uccur in lenses in tuffaceous sediments and in an underlying breccia composed of angular fragments of feldspar-pyroxene porphyry in a chlorite matrix. Radiometric assays of grab samples from the tuffaceous sediments indicate a U_3O_8 content in excess of 1%. A 1.5-foot (0.5 m) sample of core from the breccia contained 0.06% U_3O_8.

Remapping of showing 68-4 (Laporte, 1974a, b) indicates that the area is underlain by felsic paragneiss interlayered with amphibolite. To the northeast, diabase has intruded the hinge area of parasitic folds in the paragneiss. Granitic rocks and pegmatites intrude the hinge zone of a major east-trending antiform near the showing. Veins composed of a massive pitchblende core flanked by coarsely crystalline hematite-stained calcite cut bleached and hematized gneiss in three zones. Zone 1, to the east, trends 345° to 350° and consists of parallel joints and shears. Pitchblende occurs in the fractures in the central five metres (16 ft.) of the zone. Four holes drilled in Zone 1 in 1970 found uranium to a depth of 100 metres (330 ft.) and along a strike length of 200 metres (650 ft.). On strike with Zone 1 and 725 metres (2,380 ft.) to the south there is a pitchblende vein similar to the veins drilled. Zone 2, to the west, consists of pitchblende in narrow north-trending fractures of limited lateral and vertical extent. Zone 3 trends trends 315° and is exposed discontinuously for 170 metres (550 ft.) between Zones 1 and 2. Several parallel fracture systems occur between Zones 2 and 3 and the two Zones might be parts of a single 50-metre (160 ft.) wide and 180-metre (590 ft.) long mineralized zone.

Showing 69-9A (Laporte 1974a, b) was also remapped and two types of uranium occurrences were recognized: small random disseminations in Kazan Formation sandstone adjacent to Christopher Island Formation intrusives, and coatings of pitchblende, chalcocite and bornite on fractures in Christopher Island Formation rocks.

Detailed geological studies and diamond drilling of Showing 74-1W better defined the shape of the lamprophyre dyke and of the alteration zone which is crudely symmetrical about the dyke. The dyke is set of related, irregularly-shaped intrusive bodies of an aphanitic maroon rock with biotite pheyocrysts and a medium-grained hypidiomorphic rock similar to Martell Syenite. The following alteration features are associated with the dyke:

1975 AND 1976 DIAMOND DRILLING, 74-1W SHOWING

HOLE NUMBER	LOCATION (metric grid)	DIP AND BEARING OF HOLE	INTERSECTION (metres)	ROCK TYPE	MINERALIZED INTERSECTION (metres)	LENGTH OF CORE (metres)	CONTENT OF CORE U_3O_8 (%)	Cu (%)	Ag (oz/mt)
KZ 39	3+50S, 0+10E	-45°, 270°		South Channel Fm. conglomerate					
KZ 38	2+25S, 0+60E	-45°, 270°	8.5- 78.4	arkose	63.4-70.1	6.7	0.043	1.34	0.19
			78.4- 83.6	lamprophyre					
			83.6- 86.5	arkose					
			86.5- 86.9	lamprophyre					
			86.9-109.6	arkose	91.2-91.6	0.4	0.077	-	0.32
			109.6-110.9	lamprophyre					
			110.9-118.0	arkose					
KZ 37	1+75S, 0+30W	-45°, 090°	9.8- 57.5	arkose	9.8-10.7	0.9	0.078	-	0.03
			57.5- 63.9	seven 2.8 m thick lamprophyre dykes in arkose					
			63.9- 98.8	arkose	71.7-72.3	0.6	0.033	0.21	0.06
KZ 19	1+00S, 0+45E	-90°	3.1- 81.4	arkose					
KZ 12	1+00S, 0+00	-90°	4.9- 43.6	arkose	10.7-19.1	8.4	0.074	0.56	0.39
					20.7-25.0	4.3	0.059	0.16	0.12
					36.6-38.7	2.1	0.140	0.02	0.06
			43.6- 44.5	lamprophyre					
			44.5- 53.4	arkose					
			53.4- 64.0	lamprophyre					
			64.0- 97.9	arkose					
KZ 29	1+00S, 0+25W	-45°, 090°	4.3- 47.9	arkose	37.5-40.2	2.7	0.033	-	-
					37.5-38.1	0.6	0.089	-	-
					39.3-40.2	0.9	0.030	0.02	0.06
			47.9- 55.6	lamprophyre					
			55.6- 79.9	arkose	64.9-66.1	1.2	0.073	0.09	0.23
KZ 13	1+00S, 1+00W	-90°	3.6-111.9	arkose					
KZ 21	0+50S, 1+01E	-90°	1.2- 71.1	arkose					
KZ 20	0+51S, 0+50E	-90°	2.8- 60.4	arkose	11.1-22.3	11.2	0.039	-	-
					11.6-14.0	2.4	0.144	-	-
					21.7-22.3	0.6	0.120	0.62	0.13
KZ 18	0+50S, 0+00	-90°	4.3- 25.0	arkose	4.3-21.0	16.7	0.043	-	-
					17.1-21.0	3.9	0.180	0.03	0.19
KZ 25	0+46S, 0+11W	-90°	3.4-93.0	arkose	3.4- 9.8	6.4	0.200	0.06	0.24
					77.5-78.7	1.2	0.220	0.01	0.13
KZ 26	0+51S, 0+48W	-90°	4.6-100.0	arkose					
	N.B. Lamprophyre outcrops at 0+60S, 0+40E and crosses 0+50S between 0+05E and 0+10E								
KZ 11	0+00N, 0+51E	-90°	2.1-120.8	arkose					
KZ 10	0+00N, 0+00W	-90°	1.8-179.0	arkose with two <10 cm lamprophyre dykes at 90.1 m	1.8-179.0	176.2	0.088	-	-
					18.3- 19.2	0.9	0.310	0.03	0.03
					23.5- 25.6	2.1	0.210	0.03	0.03
					26.8- 30.3	3.5	0.285	0.05	0.03
					32.0- 34.8	2.8	0.220	0.03	0.03
					36.0- 36.5	0.5	0.210	0.04	0.03
					37.8- 38.4	0.6	0.140	0.03	0.02
					39.3- 40.9	1.6	0.258	0.05	0.03
					70.4- 72.0	1.6	0.080	0.22	0.02
					74.9- 92.4	17.5	0.284	0.02	0.18
					105.9-111.3	5.4	0.810	0.01	0.42
					116.8-118.7	1.9	0.124	-	0.02
					127.0-127.5	0.5	0.120	0.01	-
					130.5-131.9	1.4	0.180	-	-
					135.9-136.3	0.4	0.180	0.01	0.13
					137.3-137.9	0.6	0.170	0.19	0.19
					157.8-158.7	0.9	0.260	0.05	0.06
					177.1-179.0	1.9	0.050	-	-
KZ 16	0+00N, 0+50W	-90°	4.3- 49.7	arkose					
KZ 27	0+00N, 0+50W	-50°, 090°	4.6- 24.0	arkose					
			24.0- 25.3	lamprophyre					
			25.3- 93.5	arkose	85.4- 86.6	1.2	0.030	0.19	0.06
			93.5-104.8	lamprophyre					
			104.8-130.2	arkose	108.8-110.4	1.6	0.030	0.11	0.06
KZ 14	0+00N, 1+00W	-90°	5.8- 91.5	arkose					
KZ 22	0+50N, 0+50E	-90°	4.9- 67.4	arkose					
KZ 15	0+50N, 0+00W	-90°	6.1-111.6	arkose	6.1- 69.2	63.1	0.022	-	-
					22.9- 25.9	3.0	0.065	0.02	0.12
					44.8- 46.7	1.8	0.070	0.02	0.45
					56.4- 58.0	1.6	0.090	0.02	0.32
					59.2- 65.6	6.4	0.120	0.18	0.05
					68.9- 69.2	0.3	0:210	0.10	0.06
KZ 28	0+50N, 0+25W	-45°, 090°	8.5- 47.5	arkose	34.3- 38.3	4.0	0.017	-	-
					34.3- 35.2	0.9	0.042	0.04	0.20
					37.3- 38.3	1.0	0.029	0.02	-
			47.5- 48.1	lamprophyre					
			48.1- 49.1	arkose					
			49.1- 54.1	lamprophyre					
			54.1- 75.1	arkose					
KZ 17	0+51N, 0+52W	-90°	8.8- 69.9	arkose					

1975 AND 1976 DIAMOND DRILLING, 74-1W SHOWING

HOLE NUMBER	LOCATION (metric grid)	DIP AND BEARING OF HOLE	INTERSECTION (metres)	ROCK TYPE	MINERALIZED INTERSECTION (metres)	LENGTH OF CORE (metres)	CONTENT OF CORE U_3O_8 (%)	Cu (%)	Ag (oz/mt)
KZ 23	1+00N, 0+50E	-90^{o}	4.0- 14.6	fault zone in arkose					
KZ 34	1+00N, 0+10E	-45^{o}, 090^{o}	5.2- 22.9	arkose	19.8- 22.9	3.1	0.101	-	0.25
					20.6- 22.0	1.4	0.200	-	0.47
			22.9- 37.7	lamprophyre					
			37.7- 60.4	arkose					
KZ 35	1+75N, 0+90E	-45^{o}, 270^{o}	5.8- 95.7	arkose	81.1- 84.8	3.7	0.016	-	0.03
					82.9- 84.2	1.3	0.035	-	0.12
			95.7-101.4	lamprophyre					
			101.4-121.3	arkose	102.9-104.9	2.0	0.056	0.01	0.05
KZ 36	2+24N, 0+10E	-45^{o}, 090^{o}	6.4- 26.6	arkose					
			26.6- 28.0	lamprophyre					
			28.0- 32.9	arkose	27.9- 28.2	0.3	0.093	0.11	0.12
			32.9- 33.8	lamprophyre					
			33.8- 47.0	arkose					
			47.0- 49.0	lamprophyre					
			49.0- 51.1	arkose					
			51.1- 51.8	lamprophyre					
			51.8- 74.9	arkose					
			74.9- 85.4	lamprophyre					
			85.4-108.8	arkose					
KZ 33	2+75N, 1+30E	-45^{o}, 270^{o}	4.3- 48.1	arkose					
			48.1- 54.8	lamprophyre					
			54.8- 67.4	arkose					
			67.4- 71.0	lamprophyre					
			71.0- 99.7	arkose					
KZ 32	3+25N, 0+70E	-45^{o}, 090^{o}	4.9- 19.2	arkose					

1. very fine grained hematite coating detrital grains and in clays has been remobilized and precipitated as crystalline iron oxides incorporating other elements such as titanium. White, grey and orange coloured rocks are depleted of hematite while maroon to black spots and mottling indicate precipitation of iron oxide;
2. irregular to radiating fibrous masses of chlorite have replaced the calcite cement and clays interstitial to sand grains;
3. albite overgrowths developed on detrital feldspar and quartz grains at the expense of the calcite cement. Albitization extends further from the dyke than the chlorite and hematite alterations.

A zone of iron oxide reprecipitation and chlorite development, in proximity to the dyke, lies north of, and possibly overlies, a zone in which chlorite is well developed for considerable distances from the dyke walls but precipitation of the iron oxides is not prominent. Sulphides occur within the zone of extensive chloritization and uranium occurs in close proximity to the dyke in the iron oxide zone and further from the dyke in the chlorite zone.

Uranium-bearing minerals at 74-1W are: uraninite, as interstitial grains and irregular patches rimming quartz grains, and brannerite, as radiating, needle-like crystals in areas of calcite cement or as blebs in amorphous iron-titanium oxides and in phyllosilicates. A uraniferous phyllosilicate (chlorite ?) occurs in one stylolitic veinlet. Uranium is usually associated with chlorite interstitially in the sandstone, along silty laminae and bedding planes and as veinlets along fractures. Highly variable lead to uranium ratios in the core suggest remobilization of uranium after its original deposition. Chalcocite, chalcopyrite, a molybdenum mineral, silver and pyrite are present in the drill core.

Geological mapping and diamond drilling of Showing 75-6 indicate that it is similar to Showing 74-1W but the uranium concentrations are sporadic and of limited horizontal and vertical extent.

The lake water geochemical survey outlined 92 anomalies, 48 of which are unexplored. The remainder correspond to areas with known uranium concentrations or outcrops and boulder fields of slightly radioactive basement rocks, syenite or volcanic flows. The detailed soil geochemical and radon cup surveys on Showing 74-1W outlined linear anomalies west, and downslope, of the dyke complex.

The detailed magnetic surveys located igneous dykes within the Kazan Formation sandstones and the IP surveys outlined a 100-metre (330 ft.) long zone of anomalous chargeability probably related to disseminated chalcocite in the sandstones. The VLF-EM survey delineated many conductive zones, most of which are probably caused by resistivity variations in the overburden.

DUBAWNT LAKE PROJECT — Uranium
Shell Canada Resources Ltd., — 65 K, L, N
Box 100, — 63°05'N, 101°30'W
Calgary, Alberta, T2P 2H5.

REFERENCE
Wright (1967)

PROPERTY
The project area comprises Prospecting Permits 411 to 423 outlined in Figure IV-7.

LOCATION
The permits cover the eastern, southern and southwestern shores of Dubawnt Lake (Fig. IV-7).

HISTORY
Shell Canada Resources Limited acquired the prospecting permits in 1976 to cover 34 anomalies outlined by a reconnaissance lake sediment and airborne

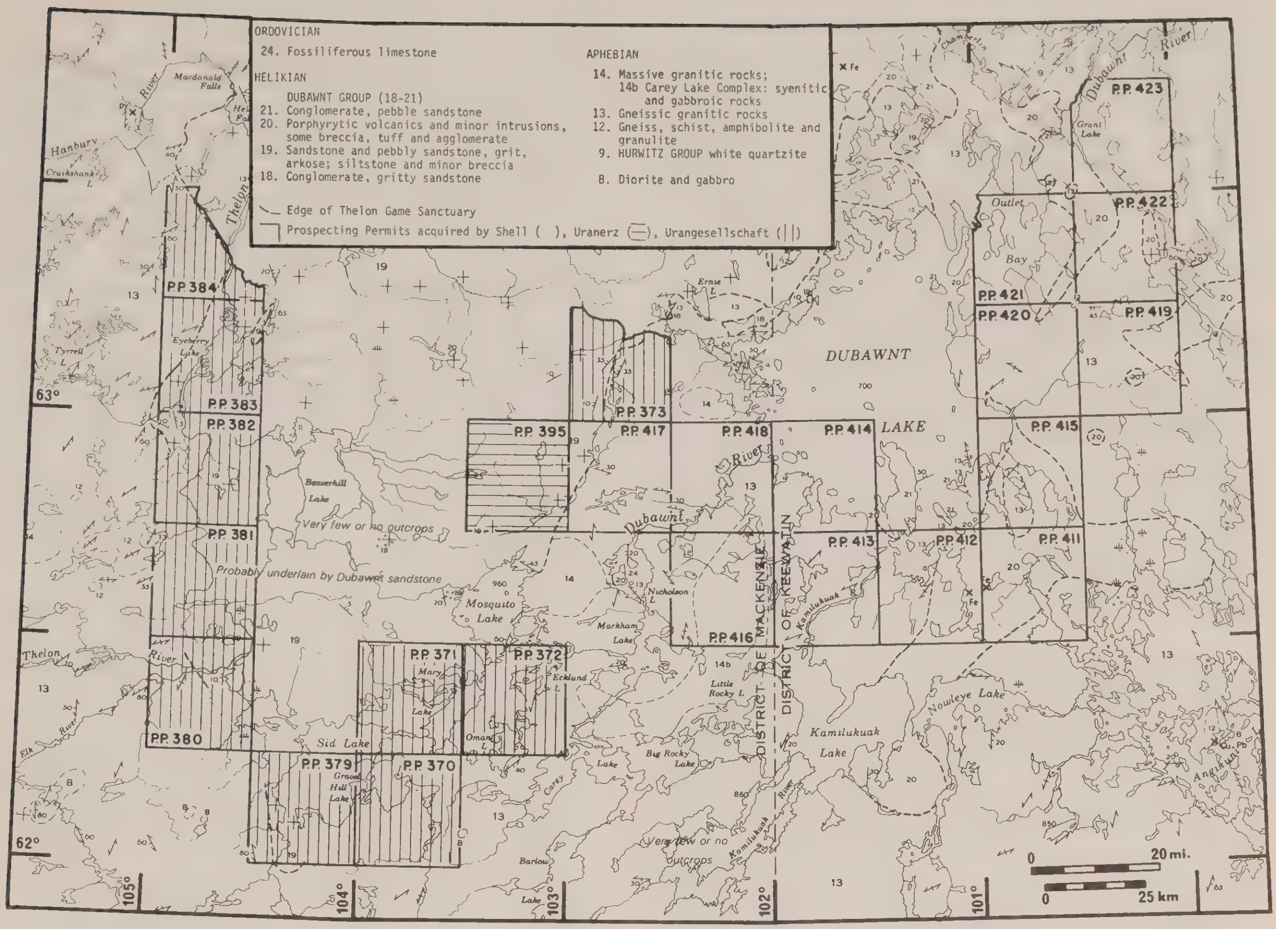


Figure IV-7: Geology and location of properties in the Dubawnt Lake Area (geology from Wright, 1967).

scintillometer survey in 1975.

DESCRIPTION

Archean and Aphebian gneissic granitic rocks underlie most of the permit areas. An 8-mile (13 km) wide and 40-mile (64 km) long north-trending arcuate belt of Helikian Christopher Island Formation volcanics overlie the basement complex east of Outlet Bay. A 10- to 20-mile (16 to 32 km) wide northeast-trending belt of Christopher Island Formation volcanics and Thelon Formation sandstone outcrops on a peninsula jutting north into Dubawnt Lake and on the southeastern shore of the lake.

CURRENT WORK AND RESULTS

Field operations in the Dubawnt Lake Project included:

(a) prospecting and geological mapping, at a scale of 1:50,000, of 34 geochemically anomalous areas detected by the 1975 reconnaissance survey;

(b) geological mapping and prospecting of the remainder of the 13 permits at a scale of 1:250,000;

(c) the collection of 1,315 lake sediment samples and determination of their uranium, copper, molybdenum, nickel, zinc, manganese and organic content;

(d) the analysis for the above six elements and for loss in ignition, of 1,237 till and stream sediment samples collected during prospecting of the anomalous areas;

(e) an airborne scintillometer survey, totalling 3,100 line-kilometers (1,926 miles) along lines 1.6 kilometers (1 mile) apart;

(f) a track-etch survey and an alpha-nuclear survey near a uranium showing and a zone of radioactivity.

Geological mapping indicates a basement complex mainly of gneissic rocks and, south of Dubawnt Lake, large granitic intrusions and smaller gabbroic bodies. The granites are massive, undeformed, coarse-grained and porphyrytic. Locally they contain fluorite and grade into the gneisses. Christopher Island Formation outcrops in two north- and east-trending belts, two to five miles (3.2 to 8.1 km) wide and 10 to 20 miles (16 to 32 km) long, east of Outlet Bay and in a 15-mile (24 km) wide belt trending southwest from Dubawnt Lake. The volcanic flows range in composition from andesite to trachyte, contain phenocrysts of biotite and pyroxene and enclose beds of agglomerates, tuff, conglomerate and siltstone. Clasts of basement gneisses are present in the agglomerates at the base of the volcanics. Quartz-feldspar porphyry of the Pitz Formation occurs as flows along the southeast shore of Dubawnt Lake and as plugs in the basement complex southwest of

the lake. Sandstone, pebbly sandstone and conglomerate of the Thelon Formation unconformably overlie basement gneisses along the western edge of the project area. Conglomerate and sandstone exposed on the southwestern shore of Dubawnt Lake and the peninsula trending north into the lake are tentatively correlated by Shell geologists with the Thelon Formation but could be part of the Christopher Island Formation. The name "Outlet Bay Granite" was used by Shell geologists to describe a complex of radioactive granitic rocks exposed east of Dubawnt Lake. Three phases were identified:

1. an extensive equigranular medium-grained salmon-coloured granite which is separated by sharply-defined intrusive contacts from
2. a pink-coloured granite with large feldspar phenocrysts, and
3. a coarse-grained red-coloured rock consisting almost entirely of K-feldspar and present only as boulders.

The Outlet Bay granite locally intrudes volcanic rocks of the Christopher Island Formation and is regarded as the hypabyssal equivalent to the Christopher Island or Pitz Formation volcanics. Other young intrusives within the area include small bodies of syenite and lamprophyre dykes east of Dubawnt Lake and two diabase dykes south of the lake.

The results of the 1976 lake sediment survey are similar to those of the 1975 survey and generally reflect anomalously radioactive rock types rather than specific uranium showings. The uranium, copper and nickel contents detected during the till and stream sediment surveys are directly related to the organic matter content. Anomalies detected by the radon surveys are apparently related to uranium concentrations.

Six uranium showings and four areas of anomalous radioactivity were outlined. Five of the showings are east of Dubawnt Lake and consist of either radioactive boulders of Christopher Island Formation volcanics or discontinuous uranium concentrations along fractures in the volcanics and the underlying Outlet Bay Granite and basement gneiss. Samples of the volcanics and the adjacent granitic rocks contained as much as 1.17% U_3O_8. A sixth showing, southwest of Dubawnt Lake, consists of mineralized fractures in granitic gneiss. A sample from this showing contained 0.03% U_3O_8. Two areas of anomalous radioactivity correspond to boulder fields of uranium-enriched granite and syenite, a third corresponds to an outcrop of Christopher Island Formation volcanics and the fourth corresponds to sandstone of the Thelon Formation.

PROJECT K-XIII, DUBAWNT BASIN — Uranium
Urangesellschaft Canada Ltd., — 65 L, M; 75 I, P
3100, 2 Bloor Street East,
Toronto, Ontario, M4W 1A8

REFERENCE
Wright (1967)

PROPERTY
Project K-XIII involved the survey of Prospecting Permits 370 to 373 and 379 to 384 shown in Figure IV-7.

LOCATION
The main area extends west from Ecklund and Carey Lakes to Mantic Lake, then north to north of Eyeberry Lake. Prospecting Permit 373 is centered southwest of Ernie Lake (Fig. IV-7).

HISTORY
The ten permits were acquired by eight different companies in 1969 and tested with airborne and ground radiometric surveys, photogeological studies and geochemical surveys. No uranium concentrations were detected. Urangesellschaft Canada Limited acquired the ten permits in 1976 to cover minor geochemical anomalies detected during reconnaissance geochemical surveys done in 1975.

DESCRIPTION
Project K-XIII was the study of the southern, southwestern and part of the southeastern edge of a north-trending basin of Thelon Formation sandstone, pebbly sandstone and conglomerate. The Helikian sediments unconformably overlie a complex of Archean and Aphebian granitic gneisses and intrusives which enclose, northeast of Eyeberry Lake, a less than one mile (1.5 km) wide belt of Aphebian quartzite.

CURRENT WORK AND RESULTS
Reconnaissance geological mapping at 1:63,360, prospecting, geochemical lake water and sediment surveys and 4,251 miles (6,850 km) of radiometric surveys along lines 0.25 miles (400 m) apart explored the permit areas. The 1,500 lake water samples collected at a density of one sample per two square miles (5 sq. km), were analysed for radon and uranium and the 1,400 lake sediment samples collected were analysed for radium and uranium. Fifty water and fifty sediment samples collected from the edges of Screech Lake, in the northwest corner of Prospecting Permit 381 and the southeast corner of Prospecting Permit 382, were also analysed for copper, lead and zinc. The radiometric surveys flown over Prospecting Permits 373, 380, 381, 384 and parts of Prospecting Permit 382 outlined 1,836 weak and 21 moderate anomalies.

Four sources of radioactivity were detected during the surveys: a thorium-rich granite outcropping on Prospecting Permit 370 which locally contains 220 ppm U_3O_8; an outcrop of Thelon Formation in the north-central part of Prospecting Permit 371 which contains radioactive heavy minerals along bedding planes; pegmatites in the northeastern section of Prospecting Permit 373 and boulders of radioactive trachytes which are distributed throughout the area.

MOSQUITO LAKE PROJECT — Uranium
Uranerz Exploration & Mining Ltd., — 65 L/14
110, 7220 Fisher Street East,
Calgary, Alberta, T2H 2H8

REFERENCE
Wright (1967)

PROPERTY
Prospecting Permit 395 — 65 L/14

LOCATION
The permit area is north of Mosquito Lake and northwest of Nicholson Lake (Fig. IV-7).

HISTORY
Prospecting Permit 395 was acquired in 1976.

DESCRIPTION
The permit area covers the southeastern edge of the main basin of Helikian Thelon Formation sandstone. A few outcrops of Thelon Formation sandstones were mapped near the east-central edge of the permit area

and outcrops of the underlying regolith in the southeastern corner of the area.

CURRENT WORK AND RESULTS

The entire edge of the sedimentary basin south of the Thelon Game Sanctuary was explored with reconnaissance geochemical survey during which approximately 1,100 lake water and 800 lake sediment samples were analyzed. A spectrometer and magnetometer survey, totalling 502 line-miles (800 km) flown along lines 0.25 miles (400 m) apart, detected two anomalies within the permit area. The anomalies were prospected and correspond to boulders and frost-heave lying on till. Two anomalous concentrations of uranium in lake sediments are related to granitic boulder fans. Numerous single sample lake water anomalies were also detected.

THIRTY MILE LAKE PROJECT	Uranium
Urangesellschaft Canada Ltd.,	65 O/7, 9; P/13
3100, 2 Bloor Street East,	
Toronto, Ontario, M4W 1A8.	

REFERENCES

Laporte (1974a, 1974b); Wright (1967).

PROPERTY

Prospecting Permit 374	65 O/7
Prospecting Permit 375	65 O/9
Prospecting Permit 376	65 P/13

LOCATION

The area covered by the three permits extends southwest from Princess Mary Lake to the Kunwak River (Fig. IV-8).

HISTORY

Prospecting Permit 376 covers ground held as Prospecting Permit 103 by Republic Resources Limited from 1969 to 1972. A photogeological study, reconnaissance geological and geophysical surveys and prospecting done in 1970 and a scintillometer survey, totalling 200 line-miles (320 km), flown in 1971 failed to outline radioactive anomalies of interest (Laporte, 1974a, b). Prospecting Permits 374 to 376 were acquired by Urangesellschaft Canada Limited in 1976.

DESCRIPTION

The permits are underlain mainly by volcanics of the Christopher Island and Pitz Formations. Kazan Formation sandstones underlie the Christopher Island Formation and outcrop on the southwest shore of Princess Mary Lake and along the Kunwak River. Sandstones and conglomerate of the Thelon Formation overlie the basement complex and the volcanics and outcrop on the island in Princess Mary Lake and in the south-central part of Prospecting Permit 375.

CURRENT WORK AND RESULTS

The radon and uranium content of water and uranium and radium content of sediment were determined for samples collected from one lake per two square miles (5 sq. km). Reconnaissance geological mapping and prospecting also explored the area.

Two groups of anomalous uranium concentrations in sediment were detected during the survey: six anomalies occur in the southwestern corner of Prospecting Permit 375, and three anomalies are in the southeastern corner of Prospecting Permit 376. A broad belt of anomalous uranium concentrations in water trends southeast in the northwest corner of Prospecting Permit 374.

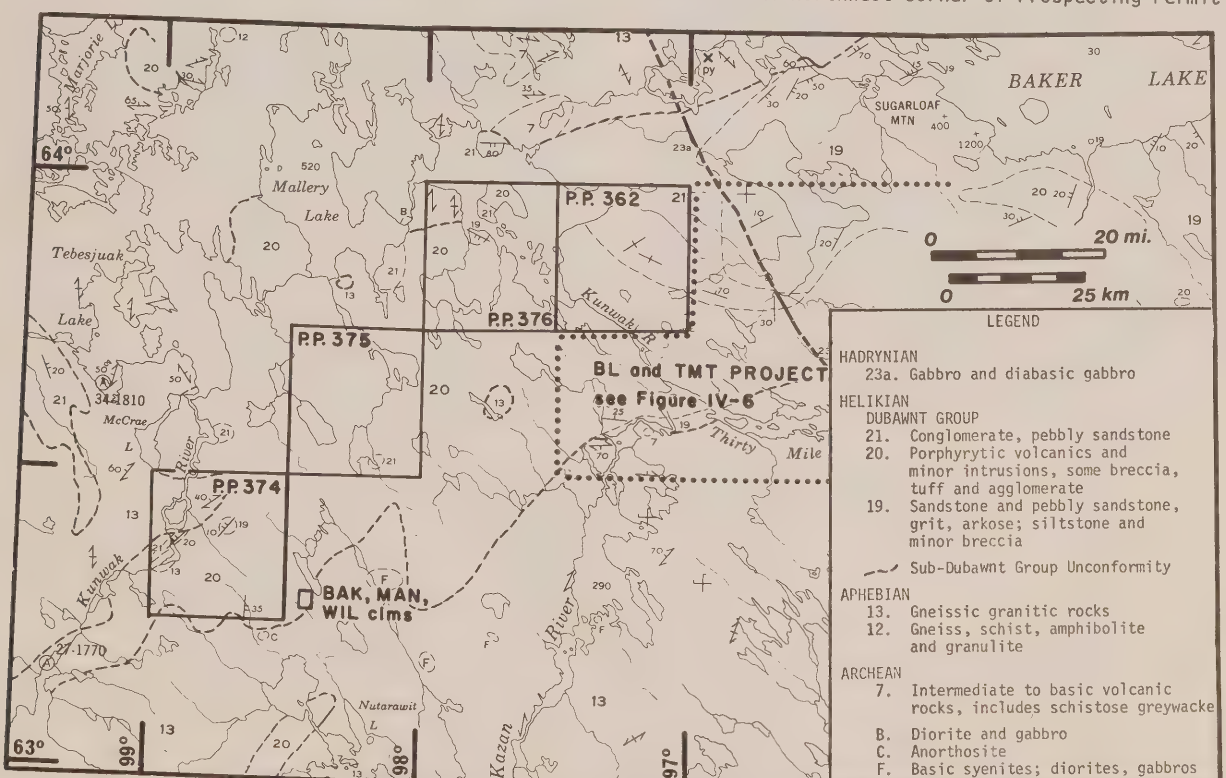


Figure IV-8: Geology of the Kunwak River area showing the locations of properties held by Urangesellschaft Canada Ltd. (Prospecting Permits 374, 375 and 376), Rio Alto Explorations Ltd. (Prospecting Permit 362) and Shell Canada Resources Ltd. (BAK, MAN and WIL claims). (Geology from Wright, 1967.)

BAK, MAN & WIL CLAIMS — Uranium
Shell Canada Resources Ltd., — 65 O/8
Box 100, — 63°35'N, 98°20'W
Calgary, Alberta, T2P 2H5

REFERENCES
Laporte (1978); Wright (1967).

PROPERTY
BAK 1-12; MAN 1-14; WIL 1-16.

LOCATION
The claims are 20 kilometers (12 miles) north-northwest of Nutarawit Lake and 50 kilometers (30 miles) northeast of Tulemalu Lake (Fig. IV-8).

HISTORY
The BAK claims were staked in 1975 and explored by geological mapping, geochemical frost-boil sampling and scintillometer surveys (Laporte, 1978). The MAN and WIL claims were staked south, east and north of the BAK claims in 1976.

DESCRIPTION
Porphyrytic volcanics of the Christopher Island Formation outcrop in the north and east parts of the claims and unconformably overlie granitic gneisses outcropping to the southeast.

CURRENT WORK AND RESULTS
A 22 line-kilometer (14 miles) grid was established on the claims, mapped at 1:2,500 and surveyed using Alpha Nuclear radon detectors with cups inserted into 70 to 90 centimeter (2.3 to 3 ft.) deep auger holes at 75 meter (250 ft.) intervals. Till samples were collected from the auger holes and analysed for uranium, manganese, nickel, zinc, copper, molybdenum and organic content. The bedrock geology and surficial geology of the claims was mapped at 1:10,000.

The geological surveys indicate that the claims cover crystalline quarto-feldspathic rocks unconformably overlain by volcanics. The Christopher Island Formation on the claims includes a basal, cherty, banded rhyolite of limited extent, porphyrytic to fine-grained syenite thought to represent either the hypabyssal equivalent of extrusive flows or a portion of very thick flows, fine-grained massive flows of trachyte to quartz-latite composition, volcanic conglomerate and layered fine-grained andesitic tuffs. Dykes of quartz-feldspar porphyry intrude the granitic gneiss and volcanics and probably represent feeder dykes for the Pitz Formation. Two zones of pitchblende-filled fractures in volcanic flows are of limited extent.

The alphameter survey outlined two significant anomalies. The uranium content of tills generally correlates with the organic content or proximity to mineralized outcrops.

PROSPECTING PERMIT 362 — 65 P/14
Rio Alto Exploration Ltd., — 63°52'N, 97°15'W
205, 736 Eighth Avenue, S.W.,
Calgary, Alberta, T2P 1H4.

REFERENCES
Donaldson (1965); Laporte (1978); Le Cheminant (1977); Wright (1967).

PROPERTY
Prospecting Permit 362

LOCATION
The permit covers the area east of Pitz Lake, southwest of Baker Lake (Fig. IV-8).

HISTORY
Prospecting Permit 362 was acquired by Rio Alto Explorations Ltd. in 1975. Taiga Consultants Ltd. prepared a photogeological study of the area.

DESCRIPTION
The permit area is underlain by volcanics of the Pitz Formation and sandstones of the Thelon Formation.

CURRENT WORK AND RESULTS
Union Oil Company of Canada Limited prospected the permit and the surrounding area in 1976.

PROJECT K-1, BAKER LAKE — Uranium
Urangesellschaft Canada Ltd., — 66 A, B, G
3100, 2 Bloor Street East,
Toronto, Ontario, M4W 1A8.

REFERENCES
Donaldson (1966, 1969); Laporte (1978); Wright (1967).

PROPERTY
The prospecting permits and claim groups explored as part of Project K-1 are outlined in Figure IV-9.

LOCATION
The project area extends from the Thelon River west to south of Aberdeen Lake and northwest to south of Deep Rose Lake (Fig. IV-9).

HISTORY
Prospecting Permits 318 to 327 were acquired by Metallgesellschaft Canada Limited in 1974 and Prospecting Permits 352 to 357 by Urangesellschaft Canada Limited in 1975. Prospecting Permits 377 and 378, acquired in 1976, and remnants of Prospecting Permits 318 to 320, 327 and 353 to 357 (Laporte, 1978) were explored in 1976. Claims SSL 1-128, SCH 1-136 and SH 1-130 were staked in 1976 to cover parts of the area retained under Prospecting Permits 318, 320 and 327 which, along with Prospecting Permit 319, lapsed in early 1977.

DESCRIPTION
The project studies cover parts of two northeast-trending belts of Aphebian metasediments and minor volcanics enclosed within granitic gneisses. Dubawnt Group sediments unconformably overlie the Aphebian and Archean rocks west of Schultz Lake (Fig. IV-9).

CURRENT WORK AND RESULTS
Seven areas were explored in 1976. In the Sissons Lake area (SSL claims) 250 miles (402 km) of radiometric surveys were flown along lines 0.125 miles (200 m) apart. A 4,600- by 2,000-foot (1,400 x 610 m) grid was established on a showing five miles (8 km) north of Sissons Lake and used as control for:

- geological mapping at a scale of 1:1,200;
- 7.8 line-miles (13 km) of geochemical sampling: 435 till and 42 float or outcrop samples collected at 100 foot (30.5 m) intervals were analysed for uranium;
- 36.1 line-miles (58.1 km) of scintillometer surveys with readings every 25 feet (7.6 m);
- 1.9 line-miles (3.1 km) of spectrometer surveys with readings every 100 feet (30.5 m) and 0.66 line-

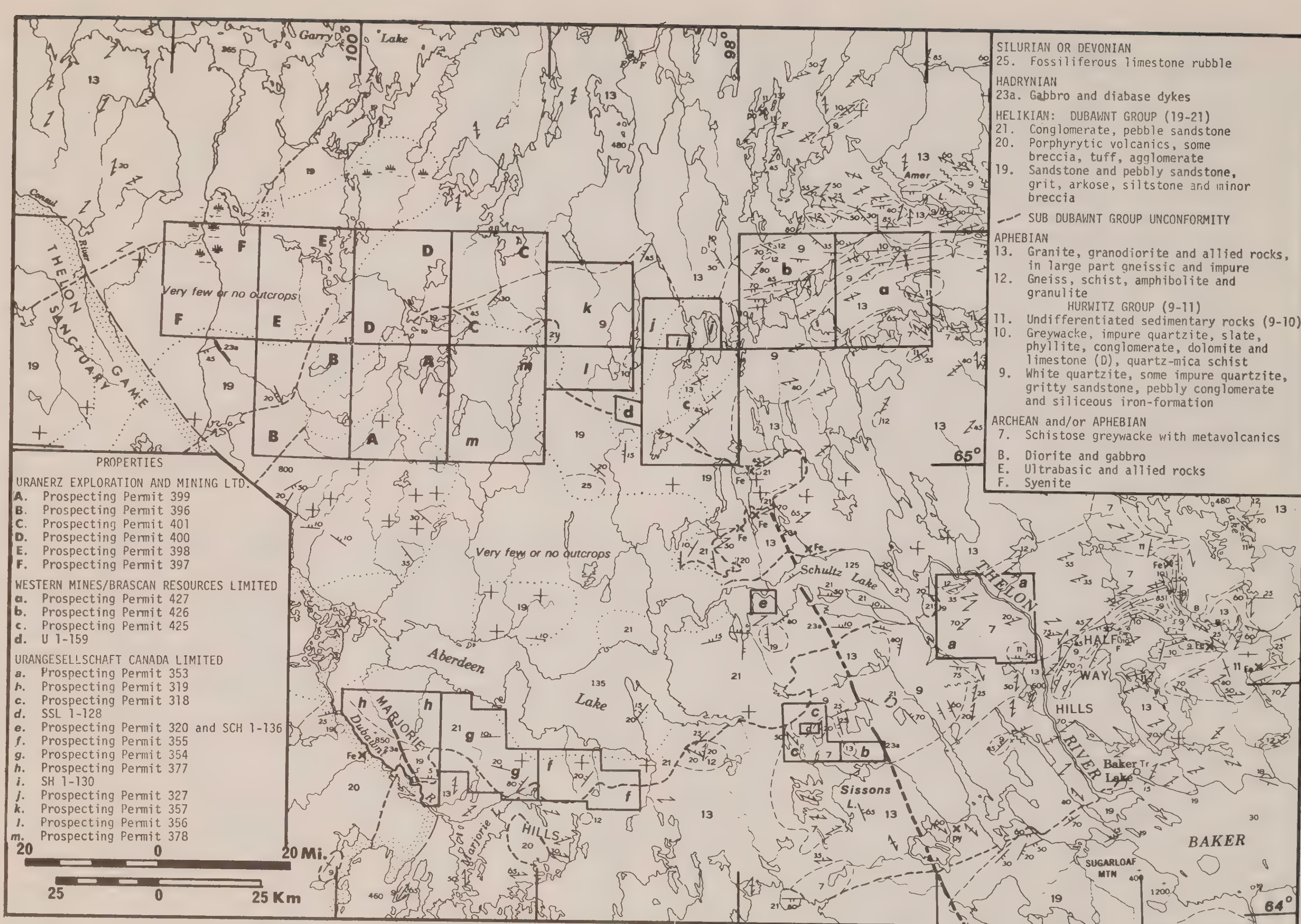


Figure IV-9: Geology of the area north and west of Baker Lake showing the location of properties (geology from Wright, 1967).

miles (1.1 km) with readings every 50 feet (15.2 m);

- 2.2 line-miles (3.6 km) of radon in soil measurements with readings at 100 and 50-foot (30.5 and 15.2 m) intervals;
- 3.2 line-miles (5.2 km) of EM-16 surveys;
- 1.7 line-miles (2.7 km) of IP surveys;
- 10.8 line-miles (17.4 km) of proton magnetometer surveys with readings every 50 feet (15.2 m);
- 16.3 line-miles (26.3 km) of fluxgate magnetometer surveys with readings every 50 feet (15.2 m) and 2 line-miles (3.2 km) with readings every 25 feet (7.6 m).

The Sissons Lake grid is underlain by shallowly-dipping impure quartzite overlain, locally conformably, by white "Hurwitz Group" orthoquartzite. Fluorite-bearing granite, syenite, lamprophyre and diabase intrude the sediments.

The north shore of Sissons Lake and of the east-trending river which drains it were explored with 215 line-miles (346 km) of radiometrics flown along lines 0.125 miles (200 m) apart. Twenty-nine of the 173 radioactive anomalies detected were prospected and correspond to outcrops or boulders of thorium-rich granite.

The peninsula west of Schultz Lake (SCH claims) was mapped at a scale of 1:27,400 and surveyed with 74 line-miles (120 km) of radiometric surveying flown along lines 0.125 miles (200 m) apart. In this area the arkose, conglomerate, litharenite and sandstone of the Thelon Formation overlie granitic gneiss and meta-arkoses of the basement complex.

Geological mapping at a scale of 1:31,680 and airborne radiometric surveying along 455 miles (732 km) of lines 0.125 miles (200 m) apart explored the Sandhills East area (SH claims). Mudstone, siltstone, sandstone and quartzite outcrop within the claims.

The Sandhills West area (Prospecting Permits 356, 357 and 378) was explored by mapping at a scale of 1:250,000; 193 line-miles (311 km) of radiometric surveys along lines 0.25 miles (400 m) apart; reconnaissance geochemical surveys of the radon and uranium content of water and sediment samples collected from lakes approximately two miles (3 km) apart within the area of Prospecting Permit 378 and detailed geochemical surveys of water and sediment samples from lakes in the southern part of Prospecting Permit 356. No interesting anomalies were found.

Prospecting Permits 355, 356 and 377, in the Aberdeen Lake area, were mapped at a scale of 1:63,360. A radiometric survey, totalling 574 line-miles (924 km) flown along lines 0.25 miles (400 m) apart and a geochemical survey of the radon and uranium content of lake water and sediment led to the discovery of one mineralized outcrop of Thelon Formation arenite.

The seventh area studied is Prospecting Permit 353 on the Thelon River. Detailed geochemical surveys to determine the uranium and radon content of water and sediment samples from all the lakes within the permit, reconnaissance geological mapping and 669 line-miles (1,080 km) of radiometric surveying along lines at 0.25 mile (400 m) intervals explored the area. The radiometric anomalies prospected were caused by migmatite and granitic pegmatites. Two groups of interesting geochemical anomalies were outlined in areas underlain by greywackes intruded by syenite dykes.

PROJECT 71-23, GARRY LAKE	Uranium
Uranerz Exploration & Mining Ltd.	66 F, G
110, 7220 Fisher Street S.E.,	65°15'N, 100°W
Calgary, Alberta, T2H 2H8	

REFERENCE
Laporte (1974a); Wright (1967)

PROPERTY
Prospecting Permits 396 to 401 are outlined on Figure IV-9.

LOCATION
The east-trending area covered by the permits is 70 kilometers (44 miles) south of Garry Lake (Fig.IV-9).

HISTORY
The permits were acquired in 1976. Prospecting Permits 396 and 399 cover areas held as Prospecting Permits 100, by Abidonne Oil Limited and as Prospecting Permit 108 by Canadian Export Gas and Oil Limited and Canadian Homestead Oil Limited in 1969 (Laporte, 1974a).

DESCRIPTION
Helikian Thelon Formation sandstones underlie the western third and southwestern quarter of the permits area. Granitoid gneisses and intrusions outcrop within a northeast-trending, 6- to 20-mile (10 to 30 km) wide area in the centre of the permits area. Aphebian orthoquartzite underlie the northern half of the easternmost permit area.

CURRENT WORK AND RESULTS
The permit areas were mapped at a scale of 1:63,360 and the Thelon Formation-basement contact was prospected. Geochemical analysis of lake water and sediment from 741 sites outlined a number of interesting anomalies. Airborne radioactive and magnetometer surveys, totalling 4,173 line-miles (6,715 km) outlined 62 anomalies, 10 of which were prospected. One radiometric anomaly on Prospecting Permit 397 was caused by gneissic to porphyrytic granite containing as much as 0.085% U_3O_8. Samples of radioactive Thelon Formation sandstone contain 30 to 50% uranium-bearing apatite and adjacent tectonized granite contains 8.5% apatite.

PROSPECTING PERMITS 425 TO 427	Uranium
Western Mines Limited,	66 G/1; H/5, 6
1414 - 390 Bay Street,	65°15'N, 97°45'W
Toronto, Ontario.	

REFERENCES
Gibbins *et al.* (1977); Heywood (1977); Laporte (1974a); Wright (1967).

PROPERTY

Prospecting Permit 425	66 G/1
U 1-159	66 G/2
Prospecting Permit 426	66 H/5
Prospecting Permit 427	66 H/6

LOCATION
The permits cover the shores of a series of lakes, extending west from Tehek Lake, southwest of Amer Lake. The U 1-159 claims are adjacent to the western edge of Prospecting Permit 425 (Fig. IV-9).

HISTORY
Prospecting Permits 425 to 427, acquired in 1976, cover ground held as Prospecting Permit 101 by Abidonne Oil Limited in 1969 and as Prospecting Permits 123 and 124 by F.T. Cousins Minerals Limited in 1969 and 1970 (Laporte, 1974a). The area of Prospecting Permit 425 was also held as Prospecting Permit 326 by Metallgesellschaft Canada Limited in 1974 (Gibbins *et al.*, 1977). The U claims were staked in late 1976.

DESCRIPTION
A 12- to 20-mile (20 to 30 km) wide belt of Aphebian Amer Group orthoquartzite, shale, siltstone, feldspathic sandstone and limestone trends southwest in the permit areas. The sediments are in contact to the southeast and northwest with granitic gneisses and are overlain to the southwest by sandstones and pebbly sandstones of the Helikian Thelon Formation.

CURRENT WORK AND RESULTS
The permits were mapped at a scale of 1:63,360, prospected and 226 water samples and 172 sediment samples were collected from the centre of deep lakes. The water samples were analysed for uranium and the sediment samples for copper, molybdenum, nickel and uranium. Five hundred water samples, collected from shallow lakes or near the shore of deep lakes, were analysed for radon and uranium. No anomalies of areal extent were defined by the deep lake survey but two sediment samples and eight water samples were relatively enriched in uranium. Six anomalies were defined by two or more samples by the shallow lake and lake shore survey. The most extensive and best defined anomaly, in the northeast corner of Prospecting Permit 426, straddles the contact between granitic gneiss and orthoquartzite.

Three major groups of rock were mapped. The basement complex consists of igneous and metamorphic rocks which enclose, in the Prospecting Permit 427, massive, hematitic and locally highly radioactive dacites. The Amer Lake Group rocks unconformably overlie this complex and include: a basal, massive, white to pink orthoquartzite with local pebble conglomerate and green argillaceous beds; green, red and black shales; silicified, locally pyritic limestone; well-banded, uraniferous siltstone, and an uppermost, locally crossbedded tuffaceous feldspathic sandstone. The Dubawnt Group rocks outcropping in the southwest part of the area unconformably overlie the Amer Lake and basement complex rocks. They include a small outcrop of maroon trachytes of the Pitz Formation, basal breccia conglomerate, pebbly sandstone and red to black mudstones of the Thelon Formation, and stromatolitic dolomite. A Helikian diabase dyke trends northwest across the centre of Prospecting Permit 425.

Nine radioactive occurrences were detected during prospecting: one is a two square foot (0.2 sq. m.) area in pebble conglomerate, six are in uraniferous siltstone, one is in uraniferous redbeds in feldspathic sandstone and one is in intraformational conglomerate of the Thelon Formation. The uraniferous siltstone has been traced 25 miles (40 km) through the permits. The laminated siltstone is locally siliceous and interbedded with arenaceous and carbonate-rich sediments.

YATHKYED - TULEMALU LAKES SUB-AREA

Massive basic volcanics, felsic to intermediate pyroclastics, metagreywacke, slate, quartzite and migmatised paragneiss, derived from greywacke and tuff, outcrop in east- to northeast-trending belts in granodiorite gneiss in the southeastern part of the area. Archean quartz monzonite, Aphebian porphyrytic quartz monzonite and hornblende syenite, possibly of Helikian age, intrude the gneiss complex south and east of Tulemalu Lake, east of Angikuni Lake and west of Yathkyed Lake. Two 18- to 25-kilometer wide belts of Helikian Dubawnt Group volcanics and sediments unconformably overlie the gneissic complex. One extends northeast from the north shore of Angikuni Lake to Nutarawit Lake and the second extends from the Kazan River and the east shore of Angikuni Lake to 15 kilometers southwest of Yathkyed Lake. Sedimentary rocks exposed at the base of the Dubawnt Group include polymict conglomerate, coarse-grained and pebbly sandstones, and interbedded fine sandstone, siltstone and mudstone. The volcanic member of the Dubawnt Group includes subaerial lavas and pyroclastics, bedded hematitic tuffs, vent breccia and minor subvolcanic intrusions.

Five companies explored the area in search of uranium concentrations at or near the contact of the Dubawnt Group rocks with the basement complex.

ANGIKUNI PROJECT	Uranium, copper, silver
Essex Minerals Company,	65 J/5, 6, 7, 10, 11
1208, 7 King Street East,	
Toronto, Ontario, M5C 1A2	

REFERENCES
Eade (1976); Eade and Blake (1977).

PROPERTY
The ANG 1-20, KAZ 1-33, LAK 1-102, MAL 1-40, ORK 1-42 and 57 TUL claims (Fig. IV-10) were surveyed.

LOCATION
All the claims are within a 8- by 40-mile (12 by 65 km) area extending northeast from the northwest shore of Angikuni Lake (Fig. IV-10).

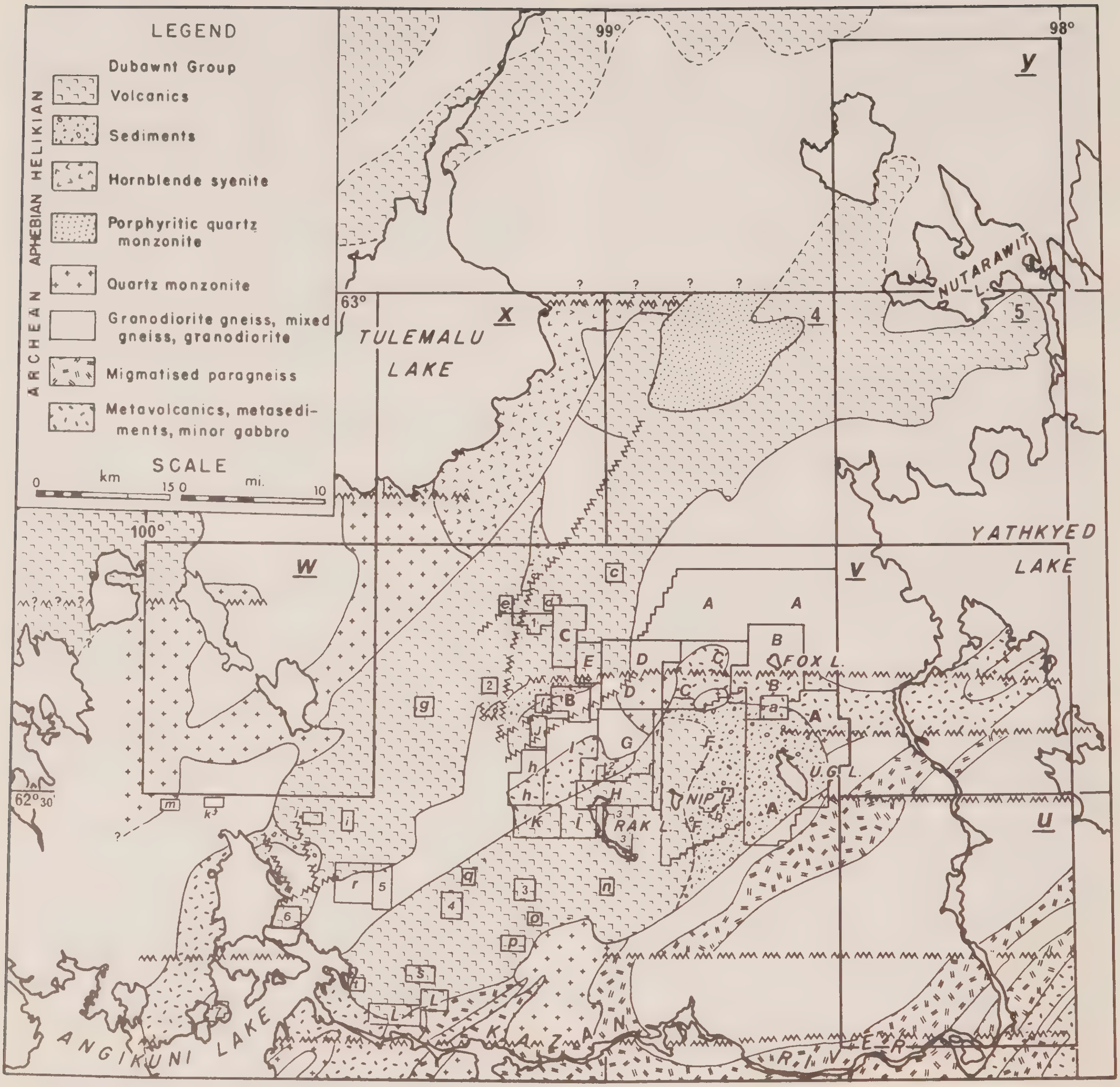
HISTORY
The claims were staked in 1976; the MAL claims lapsed in 1977.

DESCRIPTION
The KAZ, LAK and ORK claims cover volcanics and sediments of the Dubawnt Group. The main TUL group covers the apparent contact between granitoid gneiss and the overlying Dubawnt Group. Granitoid gneiss underlie the MAL claims. The small TUL group and ANG claims cover the contact zone between granitoid gneisses and Archean metavolcanics.

CURRENT WORK AND RESULTS
In 1976, Precambrian Mining Services Limited did geological, soil and water geochemical and ground radiometric surveys on 400- by 400-foot (122 m) grids over the claims. Coincident geochemical and geophysical anomalies were outlined on the main TUL group, the LAK and KAZ claims, and geophysical anomalies were detected on the ORK, ANG and TUL group.

LGT '75 PROJECT	Uranium, copper, silver
Pan Ocean Oil Ltd.,	65 J/5 to /12, 14; 0/1
1050, 3 Calgary Place,	
Calgary, Alberta.	

REFERENCES
Eade (1976); Eade and Blake (1977); Wright (1967).



ESSEX

1:TUL 1-31, 44-61
2:TUL 266-73
3:LAK 1-102
4:ORK 1-42
5:MAL 1-40
6:KAZ 1-33
7:ANG 1-20

NORANDA

A:DOG 1-854
B:97 FOG, REV 1-108, TEW 1-71
C:MUR 1-36, 82 SNO, WET 1-112, ZAK 1-24
D:BOG 1-280
E:WIT 1-60
F:680 NIP
G:46 ICE, OG 1-56, YAT 1-32, YAT 34-110, 57 YED
H:103 SOG, VER 1-35
I:FST 58-232, 234-369
J:NEST 1-32
K:RIB 1-96
L:GOS 1-35, KAZ 1-30, PIN 1-35

PAN OCEAN

a:YU 1-36
b:YU 37-61
c:YU 578-93
d:YU 546-60
e:12 YU
f:YU 562-77
g:BCZ 75-99
h:108 YME
i:YU 235-49
j:YU 531-45
k:YU 516-30
m:YU 501-15
n:YU 600-15
o:YME 1-16
p:YU 301-24
q:YU 219-34
r:YU 62-161
s:YU 325-52
t:YU 174-85
u:Prosp.Perm. 365
v:Prosp.Perm. 366
w:Prosp.Perm. 367
x:Prosp.Perm. 368
y:Prosp.Perm. 369

SHELL

1:ALC 1-19, ALD 1-17
2:NAN 1-16
3:NIK 1-25
4:Prosp.Perm. 409
5:Prosp.Perm. 410

URANGESELLSCHAFT

A:Eastern Claim Block:
A 1-36, B 1-36, BH 1-38, 45-54, C 1-36, D 1-36, E 1-36, F 1-36, G 1-36, H 1-36, I 2-37, J 1-36, K 1-36, L 1-39, M 1-36, N 1-36, O 1-8, P 1-37, Q 1-36, R 1-36
B:Southern Claim Block
CRO 1-28, 33-40, FAR 1-10, GU 1-28, UG 1-21
C:Northern Claim Block
BIL 1-21, BUG 1-28, GEO 1-28, ROD 1-28, ROL 1-21, VAN 1-21

Figure IV-10: Geology and property held in the Yathkyed-Tulemalu Lakes area (geology from Eade, 1976, and Eade and Blake, 1977).

PROPERTY

LGT '75 Project studied Prospecting Permits 365 to 369, 1 BCZ, 2 YME and 16 YU claim groups (Fig. IV-10).

LOCATION

Prospecting Permits 365 and 366 are southwest of Yathkyed Lake; Prospecting Permits 367 and 368 are south and southeast of Tulemalu Lake; Prospecting Permit 369 is north of Nutarawit Lake, and the 19 claim groups are northeast of Angikuni Lake, south of Tulemalu and west of Yathkyed Lake.

HISTORY

The YU 1 to 161 claims were staked after a reconnaissance radiometric survey was flown in August and September, 1975. The prospecting permits were acquired in 1976 and the remaining claims staked after a second survey flown in June and July, 1976.

DESCRIPTION

Prospecting Permit 369 covers granitic gneisses overlain to the west by volcanics of the Dubawnt Group. The permits west of Yathkyed Lake cover granitoid gneisses enclosing an east-trending belt of Archean metavolcanics and northeast-trending belts of migmatised paragneiss. Prospecting Permit 367 is underlain by granitoid gneisses and, in the southeast and northwest corners, volcanics of the Dubawnt Group. Prospecting Permit 368 is underlain by a 5- to 10-mile (8 to 16 km) wide and 20-mile (32 km) long intrusion of hornblende syenite in granitoid gneisses overlain to the east and south by Dubawnt Group volcanics and sediments. The claim groups cover parts of the two northeast-trending belts of Dubawnt Group volcanics and parts of the granitic gneiss basement complex.

CURRENT WORK AND RESULTS

Kenting Earth Sciences Ltd. flew 16,126 line-miles (25,952 km) of radiometric, magnetic and VLF-EM surveys in 1976. North-trending lines 0.125 miles (0.2 km) apart were flown over Prospecting Permits 365 and 366, and the area bonded by the north and east edges of Prospecting Permit 368, the west edge of Prospecting Permit 367 and the centre of Angikuni Lake. North-trending lines 0.25 miles (0.4 km) apart were flown over Prospecting Permit 369 and east-trending lines at 0.125 (0.2 km) mile intervals over the YU 1-36 claims. Numerous anomalies were detected.

Reconnaissance geological mapping, radiometric prospecting and helicopter-borne total count radiometric surveys of the YU 1-161 claims outlined small uranium concentrations in structures in the basement and conglomerate of the Dubawnt Group. The uranium in the sediments occurs as fine fracture fillings and coatings on the clasts. One sample from the YU 1-36 claims contained 0.118% U_3O_8, 0.04% Cu, and 0.36 oz/ton Ag. On claims YU 62-161, a 2-inch (5 cm) wide and 100-foot (30 m) long fracture cutting hematized basement rocks contains pitchblende, chalcopyrite, copper carbonate, pyrite and calcite.

YATHKYED PROJECT Noranda Exploration Co. Ltd., P.O. Box 1619, Yellowknife, N.W.T.	Uranium, copper, silver 65 J/6, 7, 10, 11

REFERENCES

Eade (1976); Eade and Blake (1977).

PROPERTY

The 2,486 claims held by Noranda Exploration Company Limited and Agip Canada Ltd. are listed in Figure IV-10.

LOCATIONS

A main group of 2,386 claims extends northeast and west from south of Nip Lake; the smaller GOS-KAZ-PIN group is north of the Kazan River east of Angikuni Lake (Fig. IV-10).

HISTORY

The 681 NIP claims were recorded in late 1975 and the remainder in 1976.

DESCRIPTION

Granitic gneiss and amphibolite of the basement complex underlie the north half, and volcanics and sediments of the Dubawnt Group underlie the south half of the main claim group. The GOS-KAZ-PIN group covers the southwestern edge of the southern belt of Dubawnt Group rocks.

CURRENT WORK AND RESULTS

A 1,780 line-mile (2,865 km) radiometric, magnetic and VLF-EM survey flown in August, 1975 by Kenting Earth Sciences Ltd. along lines at 1,000-foot (305 m) intervals detected uranium showings northeast of Nip Lake and the NIP claims were staked. In 1976, 202 of the 1975 airborne anomalies were investigated, the area was mapped at 1:31,680 and lake sediments were collected at one sample per 1.5 square miles (3.9 sq. km) and analysed for uranium, copper, silver, zinc and lead. A 144 line-mile (232 km) grid was established on the NIP and REV claims, mapped at 1:4,800 and surveyed with scintillometers. Soil samples were collected along 23 line-miles (37 km) of the grid at 100 feet (30.5 m) intervals. Two parts of the grid were mapped at 1:2,400 and surveyed with scintillometers, magnetometers and VLF-EM. A 1,512 line-mile (2,433 km) radiometric and magnetic survey, including 28 line-miles (45 km) of VLF-EM surveying, was flown to the southwest of the original survey, and 293 anomalies detected by this survey were prospected.

Twelve of the 1976 airborne anomalies and 75 of the 1975 anomalies are directly related to uranium concentrations occurring:

1. in shear zones and tension fractures in Archean metavolcanics and metasediments;
2. in shear zones and fractures in granitic intrusions;
3. as syngenetic concentrations in pegmatite and syenite of Aphebian age (REV claims);
4. as supergene (?) concentrations in coarse basalclastics of the South Channel Formation (NIP claims);
5. as supergene concentrations in Kazan Formation arkose and siltstones;
6. in fractures in Christopher Island Formation volcanics;
7. as low grade, syngenetic concentrations in Christopher Island volcanics.

Chalcopyrite and pyrite are generally associated with the uranium concentrations. Selected samples from the occurrences contained as much as 4.51% U_3O_8, 1.66% Cu and 3.20 oz/ton Ag.

ANGIKUNI LAKE PROJECT — Uranium
Shell Canada Limited, — 65 J/6, 11, 15, 16
1027, Eighth Avenue Southwest,
Calgary, Alberta.

REFERENCES
Eade (1976); Eade and Blake (1977)

PROPERTY
Prospecting Permits 409 and 410 and the ALC, ALD, NAN and NIK claims were studies (Fig. IV-10).

LOCATION
Prospecting Permits 409 and 410 extend west from the river flowing from Nutarawit to Yathkyed Lake. The claims are west and southwest of Yathkyed Lake (Fig. IV-10.)

HISTORY
The two prospecting permits were issued and the claims staked in 1976. The NAN and NIK claims lapsed in 1977.

DESCRIPTION
A 5- to 12-mile (8 to 20 km) wide belt of Dubawnt Group volcanics trends east-northeast across the prospecting permits and is underlain to the south, northeast and west by granitoid gneisses and amphibolites of the basement complex. Aphebian quartz monzonite and Helikian hornblende syenite outcrop in the north-central and northwestern parts of Prospecting Permit 409. The claims are underlain by Dubawnt Group volcanics.

CURRENT WORK AND RESULTS
A combined total count radiometric survey and lake sediment geochemical survey in July, 1976 was followed by prospecting of the radioactive anomalies and mapping of the prospecting permit areas. The 159 lake sediment samples, collected at approximately one sample per six square kilometers (2.3 sq. miles), were analysed for uranium, copper, nickel, molybdenum, zinc, manganese and loss on ignition. Few anomalous results were obtained and the survey did not outline the uranium occurrences discovered by prospecting. One hundred till samples were also collected and analysed but none contained anomalous concentrations of uranium. A second radioactive survey totalling 400 line-kilometers (249 miles) along lines at two kilometer (1.2 miles) intervals outlined numerous anomalies along the south margin of the Dubawnt Group outcrops in the centre of the permit areas.

Uranium concentrations found on the permits are mainly in the supracrustal rocks and consist of disseminated uraninite and fracture-fillings of pitchblende in volcanic flows and disseminated uraninite and smears of pitchblende along bedding planes in volcaniclastics. Radioactivity is also associated with altered pyritic granitic rock in fault contact with volcanics of the Dubawnt Group.

The ALD and ALC claims were staked to cover airborne radiometric anomalies detected by Bluemont Minerals Ltd. in 1970 and confirmed by Shell in 1976. Mapping and prospecting of the claims resulted in the discovery of radioactive boulders of Dubawnt Group sediments.

PROJECT K-17, YATHKYED LAKE — Uranium
Urangesellschaft Canada Ltd., — 65 J/7, 10, 11
Box 56, Toronto Dominion Centre,
Toronto, Ontario, M5K 1E7.

REFERENCES
Eade (1976); Eade and Blake (1977).

PROPERTY
Project K-17 studies covered the claims listed in Figure IV-10.

LOCATION
The northern claim block is 29 kilometers (18 miles) northwest and the southern claim block is 26 kilometers (16 miles) west-northwest of the eastern claim block which is centred on UG Lake (Fig. IV-10).

HISTORY
The eastern claim block, except the BH claims, was staked in 1975 and the other claims in 1976.

DESCRIPTION
Dubawnt Group volcanics underlie the northern claim block and the northern and western edge of the southern claim block. Granitic gneisses underlie the remainder of the southern claims. The eastern claim block covers the eastern end of the southern Dubawnt Group belt and is underlain mainly by sediments. Kaminak Group metavolcanics outcrop in the northeast corner of the block and granitic gneisses outcrop to the east and southeast.

CURRENT WORK AND RESULTS
The three claim blocks were mapped at 1:63,360 and one anomaly, on the BH claims, at 1:1,200. Twenty-four water samples were collected from lakes along the Dubawnt Group-basement contact to the west, 220 water and 181 lake-sediment samples were collected from the eastern and northern claim blocks and 339 overburden samples were collected from grids on six uranium showings. The radon and uranium content of water, uranium content of sediment and uranium, radium and, in some cases, copper, lead and zinc content of overburden samples were determined. The area was prospected with scintillometers and sixteen radioactive zones and uranium showings were found. Detailed scintillometer surveys were done over the soil sampling grids and one of the uranium showings.

Uranium concentrations were found in sheared Archean metavolcanics; fractured Dubawnt Group volcanics; in sheared and fractured Dubawnt Group sediments, and in sheared Archean gneisses intruded by a diabase dyke.

SOUTHEASTERN MACKENZIE DISTRICT

Walter A. Gibbins[1]
D.I.A.N.D., Geology Office, Yellowknife, N.W.T.

During 1976 the District Geologist for the Arctic Islands Region monitored exploration in the eastern and southeastern part of the Mackenzie District. This large region includes:

1. that part of the Churchill Province west of 104° south of the Thelon Game Sanctuary and that part of the Churchill Province northwest of the Back River north of the Game Sanctuary, and
2. that part of the Interior Platform between 120° west longitude and the Slave River and North West Arm of Great Slave Lake, to 63° north latitude.

Exploration in 1976 was confined to the southern part of the Churchill Province, south of the East Arm of Great Slave Lake and to the Interior Platform around Pine Point and Moraine Point, north of Hay River.

WESTERN CHURCHILL PROVINCE

With the exception of the Nonacho Group and related rocks, most of the Churchill Province in the Mackenzie District is a crystalline complex comprising granitic and gneissic rocks which commonly show evidence of a polymetamorphic history. The last deformation of these granitic rocks was fracturing, crushing, and in places, mylonitization. Some of them may be Archean rocks partly remobilized by Hudsonian metamorphism. The geology of the Nonacho Group has been summarized by McGlynn *et al.* (1974).

Uranium is associated here with granitic rocks but within the Nonacho Group it occurs mainly as pitchblende in narrow fracture-fillings and small veinlets in quartz stockworks, frequently in deformed rocks. Disseminated chalcopyrite is found along some of the splays of the McDonald Fault System, and native silver has been recorded as narrow veinlets in mylonitized rocks adjacent to the southern edge of the East Arm Subprovince.

Mineral exploration in the area has been sporadic for several years. Renewed interest in uranium in 1976 coincided with the May release of Geological Survey of Canada Open Files 324, 325 and 326 (Hornbrook, *et al.*, 1976), which reported the results of lake sediment geochemical surveys and the June release of airborne gamma-ray survey Map 37075G (Uranium Reconnaissance Program, 1976).

These results, combined with an earlier airborne radiometric study (Darnly and Grasty, 1972) and promising geology, resulted in considerable staking during 1976 (Fig. V-1). Canadian Occidental Petroleum Ltd., Noranda Exploration Ltd., Imperial Oil Ltd., Trigg Woollett Associates, Western Mines Ltd. (Brascan Ltd.), Saskatchewan Mining Development Corporation, Denison Mines Ltd. and several individuals staked small scattered claim blocks (Fig. V-1) coincident with high geochemical or radiometric values. Exploration did not keep pace with the staking and many claims received virtually no work in 1976. Meanwhile, the Geological Survey of Canada conducted follow-up geochemistry (Maurice, 1976 and 1977b), as did Mattagami Lake Mines Ltd. (Northern Nonacho Lake 75K and Hill Island Lake 75C), but they did not stake any claims. Mattagami Lake Mines also mapped and prospected an area near Fort Smith. Western Mines Ltd. prospected and mapped several claim groups in the area.

The western Churchill Province is studded with lakes which permit access by float-equipped aircraft from Fort Smith, Uranium City or Yellowknife.

PROJECT TALTU	75 D/16, 75 E/8,
Canadian Occidental Petroleum Ltd.,	75 F/4-6, 10-14, 75 K/4, 6-8
801 - 161 Eglington Ave. E.,	61° to 62°30'N
Toronto, Ontario, M4P 1J5	108° to 110°30'W

REFERENCES
Darnley and Grasty (1972); Henderson (1939); Hornbrook *et al.* (1976); Stockwell *et al.* (1968a); Taylor (1971); Wilson (1941).

PROPERTY
The properties consist of 384 claims in 31 separate claim groups.

LOCATION
The claim groups are scattered throughout the Nonacho Lake Basin (Fig. V-1).

HISTORY
The claims were staked in May, 1976, shortly after the release of regional lake sediment studies of 75C, F and K (Hornbrook *et al.*, 1976). Airborne radiometric surveys cover 75D and E (Darnley and Grasty, 1972). Some of the claims include areas that have been staked previously.

DESCRIPTION
The geology of the area was mapped by Wilson (1941) 75D, Henderson (1939) 75E, Henderson and Taylor (1971) 75F and Stockwell *et al.* (1968) 75K. Many of the claims are in areas of Nonacho sediments, but others include older granites and gneisses.

CURRENT WORK AND RESULTS
In July and August, Kenting Earth Sciences Ltd. flew a radiometric survey of the claims. Over 2,000 line miles were flown with aircraft equipped with an Exploranium Model DIGRS 3001 digital four-channel differential gamma ray spectrometer, a Geometrics Model G 803 proton precession magnetometer, altimeter, strip camera and recorders.

Ten separate areas were flown, the largest being near Hjalmar Lake 75 F/5 and 6. A number of radioactive anomalies were identified and recommended for ground follow-up.

NONACHO LAKE	Uranium
Imperial Oil Ltd.,	75 F and K
500 - 6th Avenue S.W.,	61°51'N, 109°33'W
Calgary, Alberta.	

REFERENCES
Hornbrook *et al.* (1976); Padgham *et al.* (1978);

PRE 1976 CLAIMS AND OWNERSHIPS

LETTER	CLAIMS	OWNER
A	KIANLA	W. Kizan
B	TRIX, REX,	Scurry Rainbow
C	BM	F. Lypka, F. Furlong
D	KAY	Pan Ocean Oils
E	BEN	Imperial Oil
F	NON	Capilano Exploration
G	NONA	Imperial Oil

1976 CLAIMS - NONACHO LAKE AREA

MAP NO.	CLAIMS	OWNER
1	GERRY, FRANK, PAUL, BREN	S.M.D.C.
2	FRANK	S.M.D.C.
3	GEW	Geo. Jones
4	KAREN, IVANKA	Denison Mines
5	TAR	Eric Hansen
6	GEW	Geo. Jones
7	DOG	Eric Hansen
8	STRIKE	Geo. Jones
9	TH	Geo. Jones
10	GERRY, FRANK, PAUL, BREN	S.M.D.C.
11	BUGS	Cynthia Brown
12	HAIR, GM	Western Mines
13	DUCK	Cynthia Brown
14	RB, GM	Western Mines
15	FLRH	S.M.D.C.
16	WAM	Western Mines
17	T & E	Geo. Jones
18	EJ, TERRY	Geo. Jones
19	SE	L. Anderson
20	GLEN	S.M.D.C.
21	LJ	Geo. Jones
22	PID, JIRI	Denison Mines
23	PIERRE	S.M.D.C.
24	CRA	Can. Ox.
25	VAL	Can. Ox.
26	CAR	Can. Ox.
27	F	Imperial Oil
28	AK	L. Anderson
29	DRC	Can. Ox.
30	RAW	Western Mines
31	M	Western Mines
32	E	Imperial Oil
33	RAM	Western Mines
34	CATHY	Mark Scott
35	ROG	Can. Ox.
36	ABC	Can. Ox.
37	BONNIE	Mark Scott
38	RAY	Can. Ox.
39	COOK	Can. Ox.
40	MIK	Can. Ox.
41	CLA	Can. Ox.
42	LAW, PAT	Can. Ox.
43	HAV, ARC	Can. Ox.
44	JOE	Can. Ox.
45	RIC	Can. Ox.
46	LL	Western Mines
47	B	Imperial Oil
48	RIC	Can. Ox.
49	BD	H.B. Bjornson
50	RAY	Can. Ox.
51	FIN	Can. Ox.
52	ALL	Can. Ox.
53	Unnamed	Denison Mines
54	D	Imperial Oil
55	Unnamed	Denison Mines
56	A	Imperial Oil
57	MPH, RAM	Can. Ox.
58	C	Imperial Oil
59	CLEM, DICK, HEP, MAR	Can. Ox.
60	LEE, CLAC, RIN	Can. Ox.
61	PAM, JOC, JOM	Can. Ox.

Figure V-1: Mineral claims Nonacho Lake Area.

McGlynn (1971b); Stockwell *et al.* (1968a); Taylor (1971).

PROPERTY
A 1-11; B 1-4; C 1-4; D 1-4; F 1-4 and NONA 1-14.

LOCATION
All of the claims are within a few miles of Nonacho Lake, which is 150 miles east southeast of Yellowknife and 150 miles northeast of Fort Smith. The A and C groups are northwest and southeast of the west end of Norman Lake, the B claims are at the southwest end of Nonacho Lake, D near the southwest end of Siltaza Lake and F between Salkeld and Thekulthili Lakes. The NONA claims are on the northwest side of Nonacho Lake near the mouth of a long narrow bay (Fig. V-1).

HISTORY
Uranium exploration has taken place on a small scale in the Nonacho Lake area for several years. A 1975 lake sediment geochemical study of the Nonacho Lake area was published as open file reports 324, 325 and 326 (Hornbrook *et al.*, 1976) in May, 1976. Claim groups A, B, C, D, E and F were staked for Imperial Oil to cover selected uranium anomalies. NONA 1-14 were staked around the NON showing (Padgham, *et al.*, 1978).

DESCRIPTION
Basement rocks of the Churchill Province are mainly gneiss or granitic rocks; however, small areas of metasediments and metavolcanics are also present. The basement is overlain unconformably by the Nonacho Group, which comprises conglomerate, slate, greywacke, arkose, quartzite and greenstone. Conglomerate occurs at the base and is usually several hundred feet thick. Arkose and quartzite are thickly bedded and contain crossbeds, ripple marks and scattered pebbles. Crossbedding measurements indicate that transport directions were south to southwest on the west side of the basin and south to southeast on the east side of the basin (McGlynn, 1971b).

Nonacho Group strata are broadly folded about northeast or southwest trending axes. Topographic lineaments are probably fault or shear zones. Faults are concentrated along the margins of Nonacho Group basin and generally destroy or obscure evidence of the unconformity.

CURRENT WORK AND RESULTS
Imperial Oil Ltd. conducted airborne radiometric and lake sediment geochmmical surveys over some of the claim groups in June and July, 1976. In August, five geologists of Trigg-Woollett and Associates examined the areas surrounding a number of airborne radiometric and lake sediment anomalies. They also prospected and mapped the claim groups. A few small radioactive occurrences were discovered, but none of these are of economic importance.

ED, BB, FHC, FC and ANNE CLAIMS	Silver, Copper
Mission Mining and Development Limited,	85 H/9
c/o Box 291,	61°41'30"N,112°10'W
Hay River, N.W.T.	

REFERENCES
Baragar and Hornbrook (1963); Lord (1951); Padgham *et al.* (1975, 1976); Reinhardt (1969); Thorpe (1966).

PROPERTY
ED 1-9; BB 1-3; FHC 1; FC 1 and ANNE 1

LOCATION
The claims are on the southeast shore of Hornby Channel in the western part of the East Arm of Great Slave Lake, five miles northeast of the mouth of the La Loche River.

A trail starting at the dock and campsite, leads up the scarp beyond the lakeshore, turns south at the top of the steep slope and leads across the outcrops to a southwesterly trending base line along which trenches and drill holes have explored mineralized shears.

HISTORY
The ED claims were staked in 1968 by Fred Diamion a prospector from Hay River, N.W.T.

In 1971, seven small trenches were blasted and three holes, totalling 288 feet, were drilled on the ED claims. In 1972, the trenches were enlarged and another 938 feet drilled. Disseminated chalcopyrite and small amounts of leaf silver smeared on shear plane surfaces were exposed in the trenches. Drilling intersected chloritized and mylonitic rocks containing narrow intervals of quartz and carbonate veinlets with disseminated sulfides. These gave erratic but generally low silver values (Padgham, *et al.*, 1975).

In 1973 the ED and BB claims were transferred to Mission Mining and Development Limited and the FC and ANNE claims were staked.

DESCRIPTION
The rocks of the claim area were mapped as "greenish grey to dark grey quartzofeldspathic chlorite-muscovite (-biotite) cataclasite schist, and fine-grained amphibolite" (unit 4 Reinhardt, 1969). Although their origin is obscured by cataclasis and recrystallization, Reinhardt concluded they were derived from Archean acid volcanics, clastic sediments and basic volcanics.

The claims lie along one of the southwesterly splays of the McDonald Fault System, which connects the La Loche River fault with the main part of the McDonald Fault System. Reinhardt (1969) observed sulphide minerals at several places along these faults. Summary accounts of some of these are given by Lord (1951, p. 176), Baragar and Hornbrook (1963, pp. 22 and 34) and Thorpe (1966, p. 29). Chalcopyrite, sphalerite and galena were the most commonly observed ore minerals.

CURRENT WORK AND RESULTS
In 1976, a 368 foot hole was drilled on the ED claims. Mylonite, crushed chloritic rock and silicified tuff contain several zones of disseminated pyrite, chalcopyrite and/or galena.

THE GREAT SLAVE PLAIN

The great Slave Plain is that part of the Interior Plains, between latitudes 60 and 64°N and between the Franklin Mountains and the western edge of the Precambrian Shield in the vicinity of Great Slave Lake (Bostock, 1964). It is underlain mainly by Paleozoic carbonates, and has a relatively flat topographic surface, generally less than 1,000 feet in elevation, that is characterized by scarce outcrop, abundant

swamp and, locally, by sink holes and karst topography. The Horn Plateau, which consists of Mesozoic strata, is a broad smooth knoll rising to 2,500 feet.

The Great Slave Plain includes the Pine Point Lead Zinc District, the source of more than three quarters of the Northwest Territories annual mineral production. Because of extensive overburden, the flat lying attitude of the host rocks, and the nature of Pine Point type mineralization, exploration is mainly by IP surveys and fence or grid drilling. Attempts to locate mineralization using rock and soil geochemistry, gravity and EM surveys have not been successful. Most work is done in the winter months when the widespread swamps and muskegs are frozen.

Pine Point Mines Ltd. (see page 11), the only operator in the area, employs several hundred people, mills about 4 million tons each year and spends nearly 2 million dollars each year exploring its extensive mineral holdings. Because most of this exploration is on mineral leases, the results are not normally reported as assessment work.

GREAT SLAVE REEF AND WEST REEF PROJECTS — Lead, Zinc
Western Mines Ltd., — 85 B/11-14
1103-595, Burrard Street, — 60°45'N, 115°10'W
Vancouver, B.C., V7X 1C4

REFERENCES
Douglas and Norris (1974); Gibbins (1978b); Norris (1965); Skall (1975).

PROPERTY
1,300 AX, 1,306 WD, 73 GSR and 12 MR claims.

LOCATION
The AX group covers a 10 by 10 mile area, straddling N.W.T. Highway 5 between the Buffalo River and Pine Point Ltd. holdings on the east and Birch Creek on the west (Fig. V-3, p. 57). The adjacent WD claims form a block 6 miles wide by 16 miles long between Birch Creek and Hay River, exploration on these claims constitutes the "west reef project".

HISTORY
Most of the area had been staked between 1965 and 1967, in a staking rush during the start of production at Pine Point. The favourable stratigraphic units are too deep to be tested by conventional geophysics and little exploration was done.

During March and April, 1975, Western Mines Ltd. acquired the AX claims and entered a joint venture with Dupont of Canada Exploration Limited to explore them. The WD and GSR claims were staked early in 1976.

Between November, 1975 and April, 1977, over 42,000 feet were drilled in 72 holes on the AX group. A 114 foot intersection in hole number 71 graded 8% lead and 17% zinc (Gibbins, 1978b).

DESCRIPTION
The 'Main Hinge Zone' (Fig. II-2, p. 11) along which many of the mineral deposits in the Pine Point district lie (Fig. 2 of Skall, 1975), extends westward across the AX and WD claims at a depth of several hundred feet. This zone corresponds closely to the Devonian Pine Point barrier reef complex which passes into time equivalent evaporites (Muskeg Formation) and tidal flat deposits (J Facies of Skall, 1975) to the south, and deep water shales to the north. Outlining, the reef complex now largely altered to coarse grained dolomite known as Presqu'ile Facies, is the initial exploration goal.

According to Skall (1975) differing rates of subsidence between adjacent areas, in the Middle Devonian created penecontemporaneous faults or hinge zones that were accompanied by slumping of unconsolidated sediments and fracturing and faulting of lithified material. These hinge zones, instrumental in Barrier Complex facies development, remained lines of weakness with occasional renewed movements and were enhanced during paleokarst development. They served as conduits for magnesium rich brines which formed the Presqu'ile dolomite and localized lead-zinc deposition.

CURRENT WORK AND RESULTS
During 1976 one hundred and thirty holes, totalling 105,000 feet, were completed and the X-25 deposit was discovered and partially delineated. Drill indicated reserves at the end of 1976 in this zone were 2,813,000 tons grading 11.9% zinc and 4.1% lead.

During 1976 Phase III drilling was done on 200 foot centers in the vicinity of the discovery hole (25), Phase II drilling was done on 1,000 foot centers in the vicinity of hole (19) (Gibbins, 1978b) and Phase I or assessment drilling was done on 3,000 foot centers on the AX, GSR and WD (West Reef) claims. Phase I drilling traced the main reef at depths of 450 to 730 feet over the entire 26 miles of strike length staked by Western Mines. Phase II drilling combined with geophysical methods explored the Main Hinge Zone. Results of the Phase III drilling are given in Figure V-2. Holes not shown on Figure V-2 are listed in the table below and are shown on Figure V-3. Additional drilling was done in 1977 and 1978.

PINE POINT ASSESSMENT DRILLING — 85 B/16
Pine Point Mines Ltd., — 60°45' to 61°N,
Pine Point, N.W.T. — 114° to 114°30'W

REFERENCES
Douglas and Norris (1974); Norris (1965); Skall (1975).

PROPERTY
HANK 1-239; KRIS 1-27; LA 1-37; TAN 1-120; W 1-27.

LOCATION
Claims drilled are all in the east end of the Pine Point property.

HISTORY
The TAN claims were staked in 1969, and the remainder in late 1975 and early 1976. This drilling is part of an on-going exploration by Pine Point Mines Ltd.

DESCRIPTION
The Pine Point area is underlain by several hundred feet of Middle Devonian strata that dip gently southwest at about 20 feet per mile (Norris, 1965 and Douglas and Norris, 1974). A northwesterly trending reef complex is contained in the sequence and most of the original Pine Point orebodies are in a coarse grained secondary dolomite facies, known as the Presqu'ile Formation, that is spatially related to the reef complex. However, most of the present reserves lie outside the Presqu'ile dolomite (Skall, 1975). The X-15 deposit in a collapse structure in the back

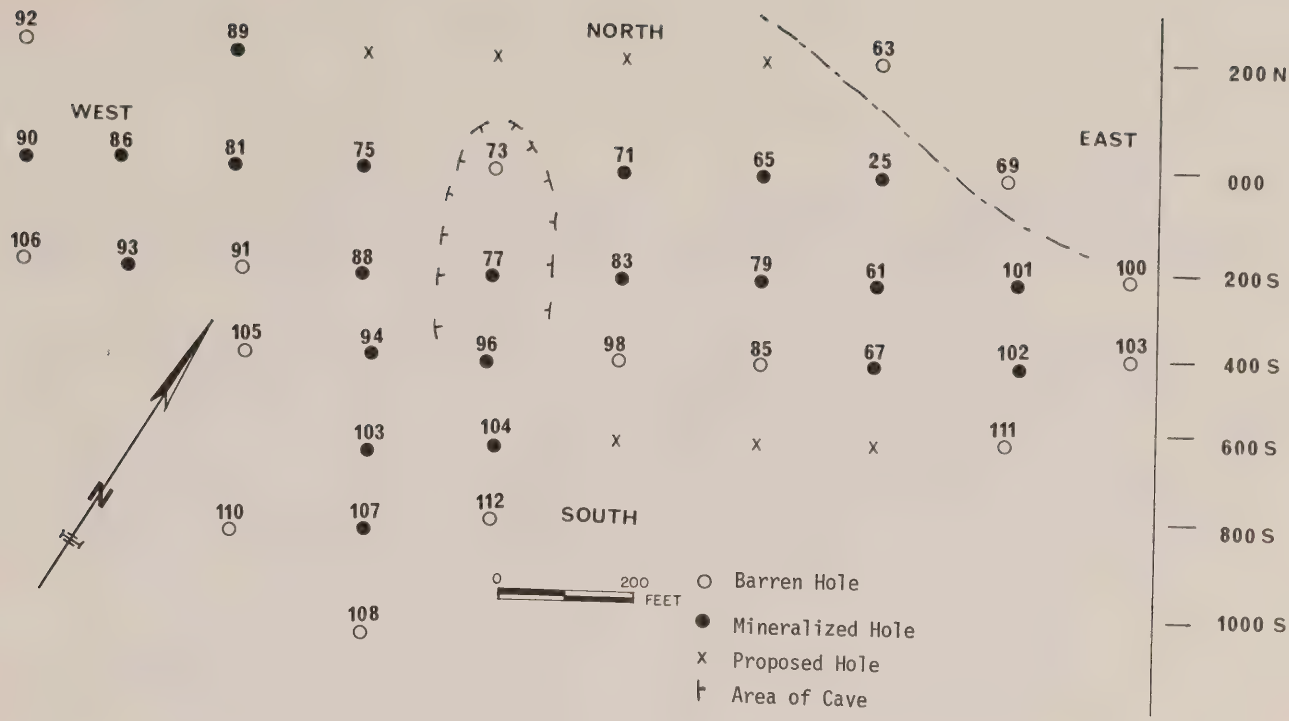


Figure V-2: Plan of Western Mines Ltd.'s Phase III drill holes

SOME OF 1976 DRILLING RESULTS

Hole	Inter-section	Lead %	Zinc %	Hole	Inter-section	Lead %	Zinc %
73	Barren			96	81 feet	0.9	2.8
75	60 feet	8.7	23.4	98	Barren		
77	2 feet	47.3	7.60	100	Barren		
79	18 feet	2.35	16.25	101	9 feet	1.71	11.4
81	86 feet	5.0	14.8	102	20 feet	0.39	1.76
83	104 feet	1.4	5.0	103	15 feet	0.05	3.51
85	Barren			104	6 feet	0.08	2.73
86	27 feet	6.2	18.6	105	Barren		
88	20 feet	3.1	13.1	106	Barren		
89	8 feet	0.45	6.0	107	35 feet	2.14	5.0
90	13 feet	0.7	3.7	108	Barren		
91	Barren			109	Barren		
92	Barren			110	Barren		
93	15 feet	0.5	1.4	111	Barren		
94	10 feet	9.2	22.3	112	Barren		

OTHER HOLES

Hole	Location in Feet Relative to Discovery Hole 25	Intersection	Lead %	Zinc %
82	Not reported	Barren		
84	Not reported	Barren		
87	Not reported	Barren		
95	000; 2,300 W	Barren		
97	000; 2,100 W	2 feet	0.02	14.5
99	000; 1,900 W	Barren		

Note: Holes to No. 73 were reported by Gibbins (1978b)

reef area and the large tabular bedded N-204 deposit in stratigraphically lower strata are examples of mineralization outside the Presqu'ile Formation. Drilling in the eastern part of the area (Fig. V-3), which contains the large N-204 and X-15 deposits, represents an attempt to discover more of these deposits.

CURRENT WORK AND RESULTS

No significant mineralization was reported in any of the 11,846 feet of assessment drilling recorded.

QITO CLAIMS
Cominco Ltd.,
200, Granville Square,
Vancouver, B.C.

Lead, Zinc
85 G/12
115°50'W, 61°36'N

REFERENCES

Douglas and Norris (1974); Gibbins (1978b); McGlynn (1971a).

PROPERTY

QITO 1-66

LOCATION

The property is 5 miles west of Moraine Point, on the west shore of Great Slave Lake, approximately 60 miles east of Fort Providence and 75 miles southwest of Yellowknife.

HISTORY

The general Windy Point - Sulfur Bay area has been explored intermittently since the early 1950's for lead-zinc mineralization of the Pine Point type (McGlynn, 1971a; Gibbins, 1978b). Present interest results from a zinc lake sediment anomaly found by a regional survey.

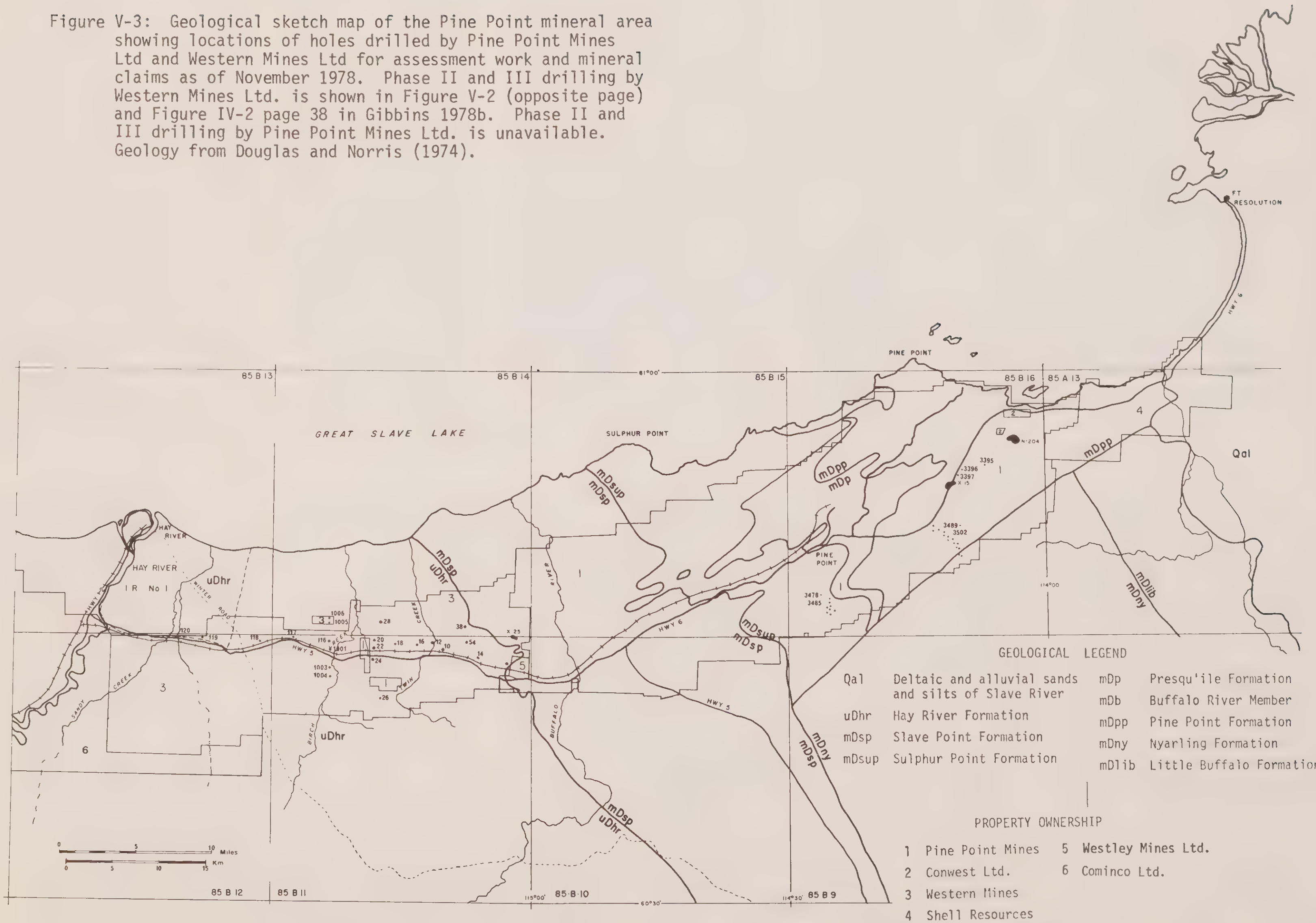
DESCRIPTION

The area is underlain by limestone and dolomite of the Middle Devonian Pine Point Formation (Douglas and Norris, 1974); however, topographic relief in the area is low and outcrop is scarce.

CURRENT WORK AND RESULTS

QITO 1-50 were staked in early July. In August, 397 soil samples were collected from the B horizon at 100-meter intervals along lines spaced 100 to 200 meters apart. Zinc and lead soil anomalies were identified, mainly on the central and western parts of the claim group. The QITO 51-66 were staked in late August.

Figure V-3: Geological sketch map of the Pine Point mineral area showing locations of holes drilled by Pine Point Mines Ltd and Western Mines Ltd for assessment work and mineral claims as of November 1978. Phase II and III drilling by Western Mines Ltd. is shown in Figure V-2 (opposite page) and Figure IV-2 page 38 in Gibbins 1978b. Phase II and III drilling by Pine Point Mines Ltd. is unavailable. Geology from Douglas and Norris (1974).



THE BEAR STRUCTURAL PROVINCE

J.B. Seaton[1] and E.J. Hurdle[2]

D.I.A.N.D., Geology Office, Yellowknife

Introductory sections to the Bear Province and its subdivisions are based on those in the 1975 Mineral Industry Report (Seaton, 1978) modified in accordance with more recent publications.

The Bear Province (Fig. VI-1) comprises rocks of Aphebian to Hadrynian age. Aphebian, predominantly sedimentary sequences flank the Slave Province; to the northeast, the intracratonic Kilohigok Basin, with its greatest thickness of sediments preserved in the Bathurst Trench; to the southeast, the Athapuscow Aulacogen (Hoffman, 1977); to the northwest Epworth Group shelf and clastic sediments of the Asiak Fold and Thrust Belt underlie a 50 mile wide zone extending 150 miles south from Coronation Gulf. There are patches of clastic sediments and volcanics of the Snare Group farther south along the western margin of the Slave Province.

West of the Cloos anticline (Hoffman *et al.*, 1978) and most of the Epworth Group rocks and west of the main exposure of the Snare Group, the mesozonal and epizonal Hepburn Metamorphic-plutonic Belt and associated metamorphosed suprocrustal rocks, extend southwards from the vicinity of the Paleohelikian Muskox Intrusion, for roughly 225 miles, to near the northern extremity of Great Slave Lake. The Hepburn Metamorphic-plutonic Belt is flanked to the west by the Great Bear batholith, an epizonal complex comprising three volcanic sequences intruded by co-magmatic granitic rocks. Helikian sediments of the Amundsen Basin unconformably overlie the Goulburn Group rocks of the Kilohigok Basin. The late Proterozoic rocks extend southwards along the axis of the Bathurst Trench. Northerly dipping Neohelikian sediments of the Dismal Lakes, Coppermine River and Ray Groups unconformably overlie Paleohelikian sediments of the Hornby Bay Group and constitute the Coppermine homocline. Late Proterozoic rocks at the mouth of Bathurst Inlet include basalts and sediments of the Coppermine River Group.

During the late nineteen sixties the basalts of the Coppermine River Series (Fraser, 1964) and those of the presumably correlative Coppermine River Group (Baragar and Donaldson, 1973) were extensively explored for fracture controlled copper mineralization particularly in the area south of Coppermine.

Properties in the Bear Provinces have been treated under the following subheadings: East Arm Sub-Province, Kilohigok Basin, Epworth Group, Great Bear Batholith or 'Volcano-plutonic Depression' (Hoffman *et al.*, 1978; Hoffman and McGlynn, 1977) and Amundsen Basin. The Great Bear Volcano-plutonic Depression includes the Camsell River and Echo Bay silver districts. Where properties overlap or are related to the boundaries between these subdivisions an arbitrary choice of subheading has been made. Under each subheading properties are reported in the orders shown in Tables VI-1 to -6.

With a few exceptions, uranium was the 1975 exploration target in the Bear Province outside the two silver districts.

[1]District Geologist, Mackenzie Region.
[2]Staff Geologist

References relating to individual property descriptions are listed separately in the appropriate sections. General information on the Bear Province and detailed reports on mapping of specific areas of the Bear Province include those by:

Allan and Cameron (1973); Badham (1972, 1978); Baragar and Donaldson (1973); Campbell (1978); Campbell and Cecile (1975); Cecile and Campbell (1977); Fraser (1964, 1974); Fraser *et al.*, (1970, 1972); Gibb (1978); Grasty and Richardson (1972); Henderson, J.F. (1949); Hoffman (1973, 1978); Hoffman and Bell (1975); Hoffman and Henderson (1972); Hoffman *et al.*, (1970, 1977a, 1977b, 1978); Hoffman and Cecile (1974); Hoffman and McGlynn (1977); Kidd (1936); Kindle (1972); Lambert (1977); Lord (1941, 1942, 1951); Lord and Parsons (1952); McGlynn (1957, 1974, 1975, 1976, 1977); McGlynn and Ross (1962); Murphy and Shegalski (1972); Mursky (1967, 1973); Padgham, Shegalski *et al.* (1974); Richardson *et al.* (1973, 1974); Robinson (1971); Robinson and Ohmoto (1973); Ross (1959, 1966); Shegalski (1973); Shegalski and Thorpe (1972); Smith (1962, 1967); Thorpe (1970); Tremblay (1971); Wilson and Lord (1942); Yeo (1976).

EAST ARM SUB-PROVINCE

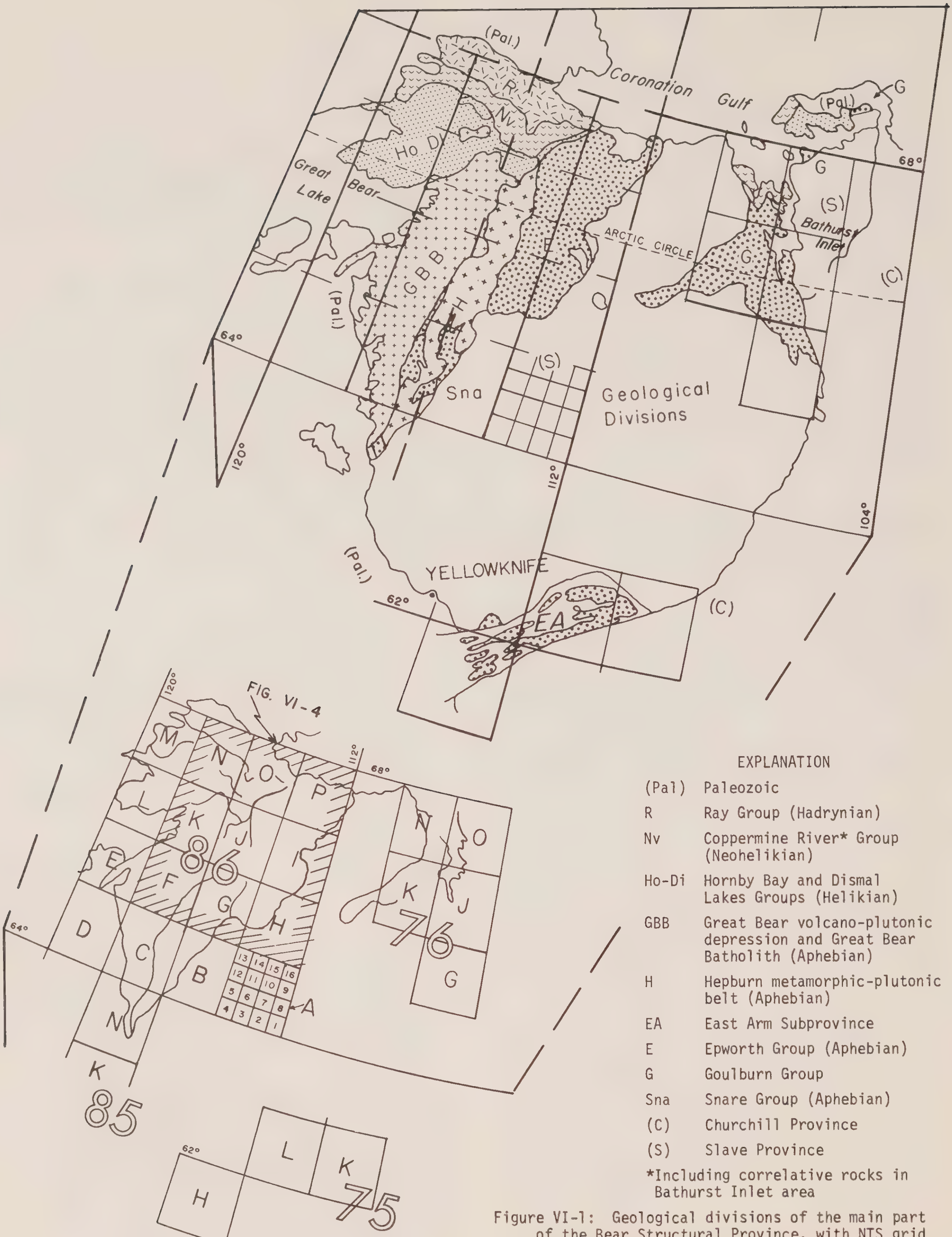
Two projects explored two claim blocks in the East Arm Sub-Province during 1976. These are listed in Table VI-1. Not included in the table is a regional base metal reconnaissance by Giant Yellowknife Mines Ltd.

Table VI-1: Properties Explored in 1976

NAME	NTS	COMMODITY
JDA	75 L/12	Cu
East Arm Project: BETH, F,G, MM, REF, SAX, SIM, TOR, VES	85 H/10,15,16	U

The East Arm Sub-Province comprises Proterozoic sediments, volcanics and intrusives emplaced in and adjacent to an aulacogen (Hoffman *et al.*, 1977a, b). Alternate interpretations of East Arm geology that exclude the rifting and aulacogen development as visualized by Hoffman have been put forward by Badham (1978); Gibb (1978).

The Wilson Island Group may be related to an early stage of rifting (Hoffman, 1977a; Yeo, 1976). The Group has been metamorphosed to greenschist and locally amphibolite grade, in which respects it differs from the unconformably overlying Great Slave Supergroup. The Wilson Island Group includes a platformal cross-bedded facies and a turbidite facies, extensive basalt and rhyolite and intrusive adamellite stocks and dykes. The unconformably overlying Great Slave Supergroup includes sediments of trough and platformal facies deposited respectively within or adjacent to the Athapuscow aulacogen. Volcanics of the Great Slave



EXPLANATION

(Pal)	Paleozoic
R	Ray Group (Hadrynian)
Nv	Coppermine River* Group (Neohelikian)
Ho-Di	Hornby Bay and Dismal Lakes Groups (Helikian)
GBB	Great Bear volcano-plutonic depression and Great Bear Batholith (Aphebian)
H	Hepburn metamorphic-plutonic belt (Aphebian)
EA	East Arm Subprovince
E	Epworth Group (Aphebian)
G	Goulburn Group
Sna	Snare Group (Aphebian)
(C)	Churchill Province
(S)	Slave Province

*Including correlative rocks in Bathurst Inlet area

Figure VI-1: Geological divisions of the main part of the Bear Structural Province, with NTS grid for property location.

Supergroup are mainly confined to the aulacogen and comprise pillowed basalts of the Union Island Group to felsic volcanics of the Seton Formation and columnar basalts of the Pearson Formation.

During the later stages of deposition of the Great Slave Supergroup the Stark Formation megabreccia was formed probably as a result of solution of salt beds originally present in the lower part of that formation and the collapse of overlying beds (Hoffman *et al.*, 1977a, 1977b). A stratigraphically correlative olistostrome (Campbell and Cecile, 1975, 1976); Cecile and Campbell, 1977) in the Kilohigok Basin could have a similar origin. After deposition of the Christie Bay Group, nappes were emplaced, though the exact mechanism of emplacement is uncertain (Hoffman, 1978). Following emplacement of the nappes diorite-monzonite laccoliths were intruded.

Conglomerates of the Murky Formation followed by lithic and feldspathic sandstones of the Preble Formation together comprising the Et-then Group succeed the Great Slave Supergroup unconformably. These sediments were deposited contemporaneously with movements of the Macdonald-Wilson Fault.

Hoffman (1973) divides deposition of sediments in the East Arm Sub-province into eight phases: Pre-quartzite, quartzite, dolomite, pre-flysch, flysch, calc-flysch, molasse and fanglomerate. Of these stages the first three and last two are confined to the aulacogen.

Currently uranium in the Hornby Channel Formation (or Hornby Formation of Hoffman, 1977b) is the main exploration target though a variety of geological settings hosting base metals have been explored intermittently in the East Arm during the last four decades. Examples include: volcanic breccia pipes, probably related to the Seton volcanics, as on the BBX Property; galena and chalcopyrite in andesitic volcanics of the Seton Formation on Keith Island; copper in fractured carbonate rocks on the Pethei and Douglas Peninsulas. Copper, the target of 1975 drilling on the COGO group at Lac Duhamel, occurs in veins cutting pre-Sosan Group granitic rocks.

JDA CLAIMS — Copper
Great Plains Development Company of Canada Ltd., — 75 L/12
715-5th Avenue S.W., — 62°35'N, 111°33'W
Calgary, Alberta.

REFERENCES
Seaton (1978).

PROPERTY
JDA 1-14

LOCATION
The JDA claims (Fig. VI-1) are at the south end of Aristifats Lake, 90 miles (145 km) east of Yellowknife.

HISTORY
Great Plains staked the JDA claims in 1975.

DESCRIPTION
The claims are underlain predominantly by andesitic tuff, with minor andesitic pyroclastics and sediments of the Aphebian Kahochella Group.

Layering in the volcanics dips at about 15° to the east.

CURRENT WORK AND RESULTS
Prospecting of the claims found minor amounts of chalcopyrite and bornite in thin quartz carbonate veins in andesitic tuff.

EAST ARM PROJECT (Simpson Islands) — Uranium
SERU Nucleaire Canada Ltee., — 85 H/10, 15, 16
320, 1 Place du Commerce, — 61°48'N, 112°30'W
Nun's Island, Montreal,
H3E 1A2.

REFERENCES
Hoffman (1968, 1978a); Hoffman *et al.* (1977b); Reinhardt (1972); Stockwell (1936).

PROPERTY
17 BETH claims; 3 F claims; 24 G claims; 52 MM claims; REF 1-39; SAX 1-38; 29 SIM claims; TOR 1-9; VES 1-4.

LOCATION
The 216 claims (Fig. VI-2) are in the East Arm of Great Slave Lake and extend about 15 miles (24 km) along the southern shore of north Simpson Island. The western part of the claim group covers the narrow Vestor Channel.

HISTORY
Vestor Explorations Limited acquired a group of 36 claims from the Pinetree Syndicate in 1969. Ground radiometric prospecting, mostly on the Simpson Islands detected numerous anomalies and 331 more claims were staked between 1969-70. Following mapping and detailed radiometric surveys Vestor trenched anomalies. Seven radioactive zones were tested by a total of 8,724 feet of drilling in 42 holes.

In 1972 Amok Ltee. optioned the property. After soil sampling, radon emanometry, mapping and radiometric surveys of Vestor's drill holes they terminated the option.

In 1976 SERU Nucleaire Ltee. optioned two groups of Vestor's claims; one Simpson Islands, the other, the 26-claim OUI group on Preble Island.

DESCRIPTION
The locations of the East Arm Project Properties are shown in Figure VI-1 Hornby Channel Formation of the Sosan Group (Fig. VI-2) outcrops discontinuously along the shores of Hornby Channel, Simpson Islands, Preble and Union Islands, surrounding a largely water covered area where Sosan Group and Archean rocks outcrop on islands.

SERU's claims on Simpson Island are mainly underlain by Hornby Channel Formation flanked by granitic Archean basement. The Easter Island gabbro dyke strikes northeasterly near the northwest margin of the claims and follows the faulted contact between Archean and Hornby Channel Formation (Hoffman, 1977b).

CURRENT WORK AND RESULTS
Detailed mapping by SERU Nucleaire in 1976 subdivided the Hornby Channel Formation into a number of units, by the percentage and size of clasts in the conglomeratic sandstones and the grain size of the matrix.

SERU's interpretation of the Vestor Diatreme at

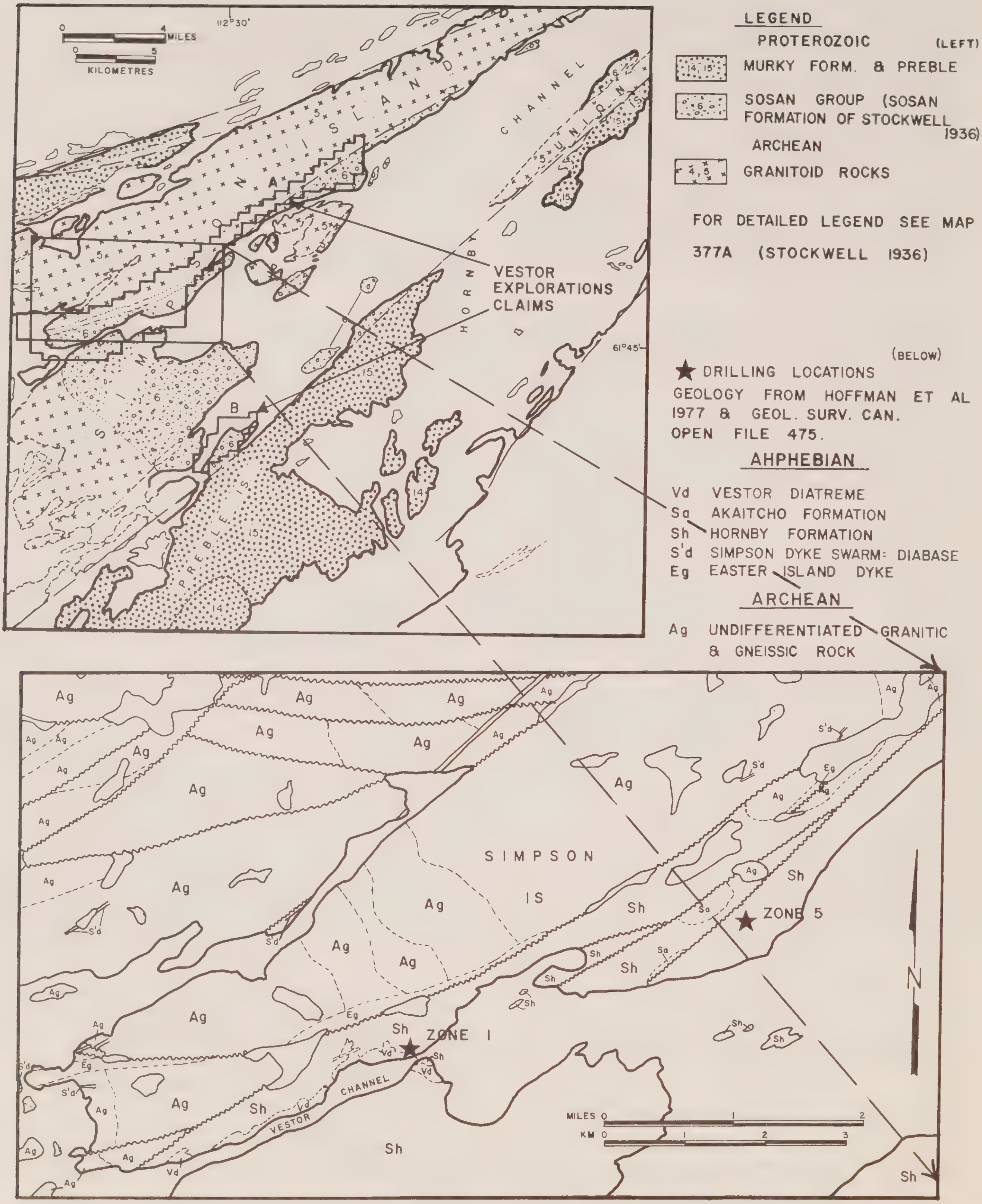


Figure VI-2: Location and geological setting of the East Arm Project

Vestor Channel as a thrust wedge of the Stark Formation, enclosed in older Hornby Channel Formation contrasts with interpretations by Hoffman (1977b, 1978) and Reinhardt (1972).

Bostonite has been mapped by SERU Nucleaire geologists as intrusive into the Hornby Channel Formation in which case Hoffman's (1978a) interpretation of age relations between dyke, Sosan Group and Vestor Diatreme suggests that the bostonite intrusives are much younger than the Easter Island Dyke for which dates of 2170 and 2200 m.y. have been recorded.

Three diamond drill holes, totalling 1,419 feet tested the No. 1 radioactive zone at Vestor Channel. Two holes tested the No. 5 zone about 4 miles (7 km) to the northeast. The holes were logged radiometrically.

KILOHIGOK BASIN

The Goulburn Group delineates the northeastern part of the once much more extensive intracratonic Kilohigok Basin (Campbell and Cecile, 1976).

Apart from a few thin basalt flows in the Brown Sound Formation and pipe and dyke breccia complexes of late or post Goulburn Group age, the Kilohigok Basin was filled by sedimentary rocks. The formations can be grossly correlated on lithologic grounds with those of the Athapuscow aulacogen and the Epworth Group.

TABLE VI-2: Properties Explored in the Kilohigok Basin

NAME	NTS	COMMODITY
JT	76 J/6	U
SBI	76 J/2	U

SBI CLAIMS

SERU Nucleaire Ltee.,
320, 1 Place du Commerce,
Nun's Island,
Montreal, Quebec, H3E 1A2

Uranium
76 J/2
66°07'N, 106°55'W

REFERENCES
Campbell and Cecile (1975, 1976)

PROPERTY
SBI 1-72

LOCATION
The claims are about 350 miles (565 km) northeasterly of Yellowknife. The centre of the claim block lies about four miles southeast of Bathurst Lake.

HISTORY
The claims (Fig. VI-3) were staked in 1976 following a regional study of the area which included stratigraphic sections on the east and west sides of Bathurst Inlet, reconnaissance radiometric surveys and prospecting.

DESCRIPTION
Fine grained, red dolomitic sandstones of the Burnside River Formation underly the southern part of the claims. These rocks are overlain, to the north by stromatolitic dolomites and dolomitic sandstones of the Quadyuk Formation. The north and northeast part of the claims is underlain by rocks of the Peacock Hills, Kuuvik and Brown Sound Formations.

A mile wide zone of anastomosing northwesterly trending faults transects the northeast half of the property and is adjacent to the main Bathurst Fault, which has a sinistral strike slip component of about 55 miles. The zone corresponds roughly with the axis of the Bathurst Trough.

Geological mapping of the zone did not differentiate between the dolomitic siltstones of the Peacock Hills Formation, dolomitic siltstones and stromatolitic dolostones of the Kuuvik Formations and units of the Brown Sound Formation. However, an arkosic siltstone and a lower dolomitic siltstone unit of the Brown Sound Formation were recognized northeast of the property.

CURRENT WORK AND RESULTS
A helicopter-borne radiometric survey covered the claims and a larger surrounding area. The work was followed by ground checking of the anomalies, which located a radioactive occurrence with a uranium to thorium ratio of about 1:5 in pyritic sediments of the Burnside River Formation. Geological mapping at 1: 20,000 was completed over an area of about 80 square miles which included the claim block.

JT CLAIMS

SERU Nucleaire,
320, 1 Place de Commerce
Nun's Island,
Montreal, Quebec, H3E 1A2

Uranium
76 J/6
66°20'N, 107°26'W

REFERENCES
Campbell and Cecile (1975, 1976).

PROPERTY
JT 1-87

LOCATION
The claims (Fig. VI-3) are about 350 miles (565 km) northeasterly of Yellowknife and just west of Bathurst Lake which is 400 feet from the property boundary.

HISTORY
The claims were staked in the fall of 1976 following a regional study of the area which included stratigraphic sections on the east and west sides of Bathurst Inlet, reconnaissance radiometric surveys and prospecting.

DESCRIPTION
The claims are southwest of the axis of the Bathurst Trench and the strikes of bedding and many of the faults are northwest parallel to this axis. Diabase dykes on and adjacent to the claims have been segmented by westerly northwesterly and northerly striking faults.

The property is underlain by highly fractured rocks of the Brown Sound Formation; in the southwestern third by locally mottled, red and green dolomitic siltstones with beds of dolostones and in the northeastern two thirds by an overlying arkosic sandstone.

The Kuuvik Formation which is composed mainly of dolomite beds, outcrops about one mile west of the claims. The Amagok Formation is exposed between the northeast boundary of the claims and Bathurst Lake. Brown Sound Formation is exposed beyond the Amagok Formation about a mile from the northeast shore of the lake.

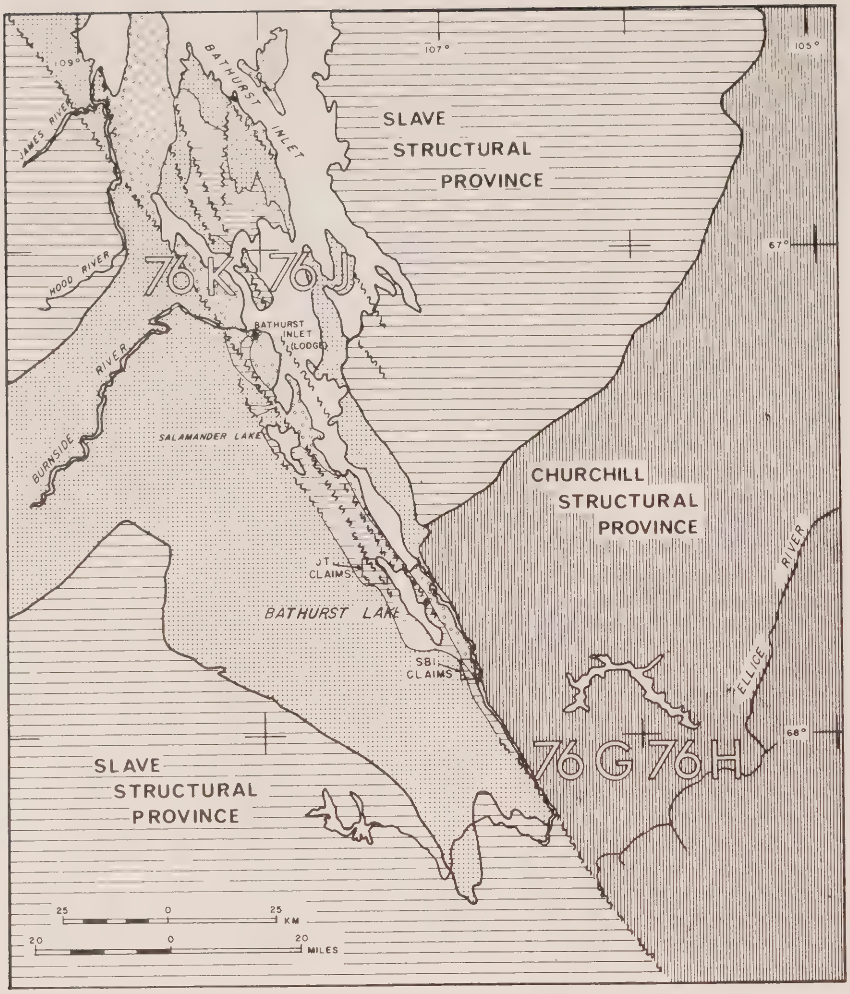


Figure VI-3: Generalised geology of Bathurst Inlet area and location of JT and SB1 claims

CURRENT WORK AND RESULTS

A helicopter-borne radiometric survey covered the claims and a larger surrounding area. Ground checking of the anomalies followed. Of the two anomalies detected on the claims, one, which has a very high uranium to thorium ratio, is associated with a brecciated dolostone at a diabase dyke contact; the other anomaly which has a uranium to thorium ratio of less than one is in fine grained red quartzite.

EPWORTH GROUP

Properties in Epworth Group rocks east of the Cloos anticline (Fig. VI-4) are described in this section. There are no properties in Epworth rocks that are involved in the Hepburn Belt. Structural subdivisions of the Epworth Group rocks include an autochthonous zone of unmetamorphred shelf type sediments abutting the Slave Province in the vicinity of the Tree River between Takijuq Lake and Coronation Gulf (Hoffman, 1973). West of this zone lies the Asiak Fold and Thrust Belt which includes the internal zone and part of the external zone of the Coronation geosyncline (Hoffman *et al.*, 1978). The relatively unmetamorphosed external zone, composed like the autochtonous zone largely of shelf type carbonates and clastics, is separated by the Cloos anticline from the internal zone, which is dominated by turbidites. The Cloos Anticline is cored by metabasalt of the Vaillant Formation. Metamorphic grade increases westward of the Cloos Anticline towards the Hepburn Batholith.

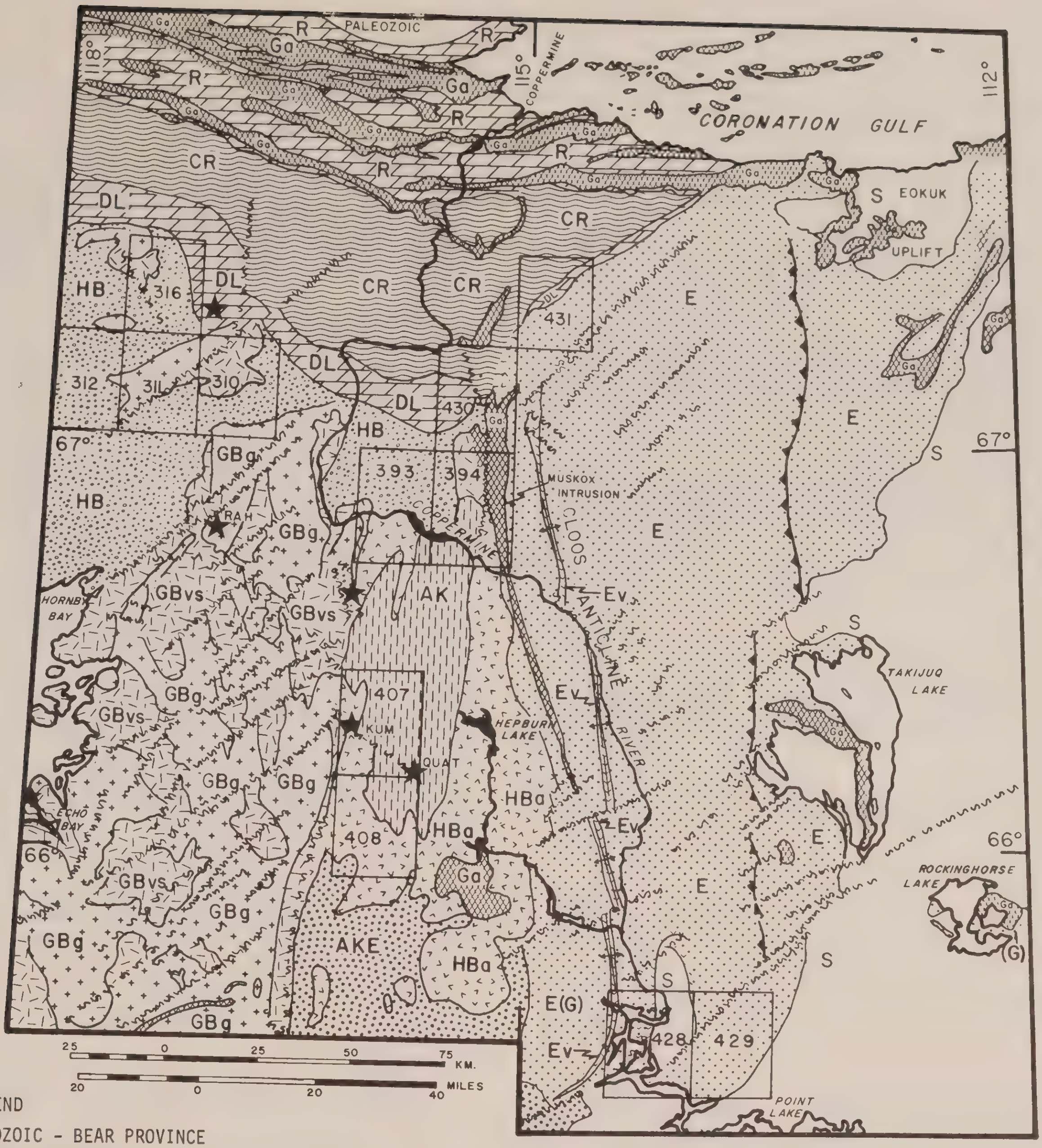
TABLE VI-3: Properties Explored in 1976

NAME	NTS	Commodity
Prospecting Permits 428, 429	86 G/9, 86 H/12	U
Prospecting Permits 430, 431	86 O/3, 86 O/7	U

PROSPECTING PERMIT 428, 429 — Uranium
SERU Nucleaire (Canada) Ltee., — 86 G/9; H/12
320, 1 Place du Commerce — 65°30' - 65°45'N
Nun's Island, — 113°30' - 114°30'W
Montreal, Quebec, H3E 1A2

REFERENCES

Fraser (1974); Hoffman *et al.* (1978a); Hoffman *et al.* (1971); Hoffman (1970).



LEGEND

PROTEROZOIC - BEAR PROVINCE

Hadrynian

R — Rae Group

Neohelikian

CR — Coppermine River Group; basalt, sandstone, siltstone.

DL — Dismal Lakes Group; dolomite, mudstone, sandstone and intercalated black shale.

Paleohelikian

HB — Hornby Bay Group; sandstone, siltstone, shale, dolomite, minor conglomerate.

Upper Aphebian

GBvs — Volcanics and sediments of Great Bear volcano-plutonic depression

Lower Aphebian

E(G) — Epworth Group, and Goulburn Group; sandstone, dolomite, chert, siltstone, greywacke and mainly pelitic metasediments.

Ev — Epworth Group; pillowed metabasalt.

AK — Akaitcho Group; metabasalt, metafelsite and mainly pelitic metasediments.

ARCHEAN - SLAVE PROVINCE

S — Granitoid rocks and supracrustals

Ga — Gabbro and diabase, mainly Hadrynian.

GBg — Granitoid rocks of Great Bear volcano-plutonic depression

HBa — Granitoid rocks of the Hepburn Batholith

AKE — Migmatite, gneisses and undivided Akaitcho, Epworth & Snare Groups

★ Uranium occurrence

Prospecting Permits*	Company
310-312	B.P. Minerals Ltd.
316	Imperial Oil Ltd.
393, 394	B.P. Minerals Ltd.
407, 408	Cominco Ltd.
428-431	Seru Nucleaire (Canada) Ltee

*Extent of Permits as originally granted shown on map.

Figure VI-4: Prospecting Permits in the Coronation Geosyncline area, explored in 1976. Geology from Hoffman *et al.* (1978) and McGlynn (1977).

PROPERTY
Prospecting Permits 428, 429.

LOCATION
The permits (Fig. VI-4) are north of Redrock Lake, about 330 kilometers (205 miles) north of Yellowknife.

HISTORY
SERU Nucleaire (Canada) Ltee. acquired the permits in 1976.

DESCRIPTION
Archean metasediments and metavolcanics of the Yellowknife Supergroup; Archean granitic rocks, granite gneiss and migmatite; Aphebian sediments of the Epworth Group; and Helikian diabase dykes and sills underlie the area.

CURRENT WORK AND RESULTS
Airborne and ground scintillometer surveys, geological mapping at a scale of 1:60,000 and stratigraphic studies at a scale of 1:2000 were done. Two north-northeast trending faults in migmatite on Permit 428 contain thorium rich zones up to 200 meters (656 ft.) long.

PROSPECTING PERMITS 430, 431	Uranium
SERU Nucleaire (Canada) Ltee.,	86 0/3, 7
320, 1 Place du Commerce	67°00' - 67°30'N
Nun's Island,	114°30' - 115°30'W
Montreal, Quebec, H3E 1A2	

REFERENCES
Baragar and Donaldson (1973); Hoffman *et al.* (1978); Hoffman *et al.* (1971); Hoffman (1970).

PROPERTY
Prospecting Permits 430 and 431.

LOCATION
The permits (Fig. VI-4) are about 65 kilometers (40 miles) south of Coppermine.

HISTORY
SERU Nucleaire (Canada) Ltee. acquired the permits in 1976.

DESCRIPTION
The area is underlain by a great variety of rocks including Aphebian sediments of the Epworth Group and porphyritic felsite and granite of the Hepburn Batholith; Helikian intrusions and sediments; gabbros and ultramafics of the Muskox intrusion; sediments of the Dismal Lakes Group and by the basalts and intercalated sandstones of the Coppermine River Group. Helikian diabase dykes and sills and Hadrynian gabbro sills and dykes cut most of the older rock units.

CURRENT WORK AND RESULTS
Airborne and ground scintillometer surveys, geological mapping at a scale of 1:60,000 and stratigraphic sections at a scale of 1:2,000 tested the permits. One small anomaly was detected within a quartz-garnet-amiphibole migmatitic band in granitic gneiss at the northwest edge of the area underlain by Epworth Group rocks.

THE GREAT BEAR BATHOLITH (VOLCANO-PLUTONIC DEPRESSION)

The late Aphebian epizonal Great Bear Batholith and its associated comagmatic volcanics and volcanoclastics is bordered to the east by the Hepburn Metamorphic - Plutonic Belt, a mesozonal and eipzonal complex of granitic rocks and gneisses, from which it is separated for much of its length by the Wopmay Fault.

To the west the Great Bear Batholith and related supracrustals are flanked by Paleozoic sediments and by the waters of Great Bear Lake. To the north Helikian sediments of the Amundsen Basin overlie, or are in fault contact with granitic rocks and associated volcanics of the Great Bear Batholith, but locally, as in the vicinity of the Dismal Lakes, exposures of Aphebian rocks of Great Bear Batholith type form hills surrounded by Helikian sediments of the Amundsen Basin. The Aphebian rocks have been subjected to intense paleosaprolitic alteration prior to the deposition of the Helikian sediments (Hoffman and McGlynn, 1976); a fact of significance to uranium exploration.

The northern part of the Great Bear Batholith is a complex composed of a great thickness of intermediate to acidic ignimbrites and lavas intruded by comagmatic plutons. The volcanics and asoociated mainly volcanogenic sediments include the Echo Bay and Cameron Bay Groups of earlier literature; terms which were superceded (Hoffman and Bell, 1975) and replaced by subdivisions of the Sloan River Volcanics. The old Echo Bay and Cameron Bay Groups were included in the Western Sequence of the Sloan River Volcanics. A more comprehensive informal stratigraphic nomenclature was proposed by Hoffman and McGlynn, 1976.

The Western Sequence, which includes a large andesitic shield volcano in the Port Radium area, hosts the uranium and silver veins of the Eldorado and Echo Bay Mines. The Camsell River Silver District is underlain by a northwesterly plunging syncline of Western Sequence rocks, possibly originally contiguous with, but now separated from the Echo Bay area rocks by a major dextral, northeast striking transcurrent fault.

The Great Bear volcano plutonic depression has a northerly plunge which causes progressively more exposure of its plutonic core to the south.

Vertical and perhaps transcurrent movements on the Wopmay Fault during explacement of the Great Bear Batholith influenced the thickness and distribution of the related volcanic and sedimentary sequence. The greatest thickness of volcanics and volcanogenic sediments were impounded on the western (downthrow) side of the Wopmay Fault. North of latitude 66°, ash flows, mudstones and conglomerates of the upper part of the Sloan River volcanic sequence transgress the Wopmay Fault (Hoffman and McGlynn, 1977).

Northeasterly striking dextral strike slip faults and related divergent fractures are loci of uranium and silver deposition in the Echo Bay and Camsell River districts. Similarly striking faults and related giant quartz veins are closely associated with uranium mineralization in the Rayrock Mine area, in the south of the Great Bear Batholith, and in the western margin of the batholith as at Beaverlodge Lake. At Beaverlodge Lake however, the "giant quartz vein" may be a massive quartzite. Massive chalcocite accompanied by bismuth occurs adjacent to a northeast

striking giant quartz vein on the PATCH claims north of the Sloan River.

Numerous small uranium showings throughout the Great Bear Batholith are fracture controlled and commonly accompanied by hematitic alteration and locally by magnetite. The better showings are podlike concentrations of high grade pitchblende, or uraninite which may be associated with copper mineralization as near Mazenod Lake, near the southwest margin of the Bear Province.

Uranium and locally associated copper mineralization is also found in a discontinuous belt of porphyritic rocks, which may in part be a southern equivalent of the Sloan River Volcanics preserved as roof pendants in granitic rocks.

Copper mineralization at two locations near the Norex silver deposit has been ascribed characteristics typical of some porphyry copper deposits (Murphy and Shegelski, 1973; Shegelski and Thorpe, 1972), but as yet nowhere in the Bear Province have such deposits been found of a size comparable with those commercially exploited.

TABLE VI-4: Properties Explored in 1976

PROPERTY	NTS*	COMMODITY
B Claims	85 K/16	U
LLO Claims	85 N/1	U
DIANNE, SUE	85 N/10, 15	Cu U
JM	85 N/1	U
JONES Claims	86 C/15	U
NAGA Claims	86 E/3	U
Prospecting Permits 387-392	86 E/3,4,6,7,10,11	U
LEITH Claims	86 E/6	U
YETA Claims	86 E/6, 7, 10, 11	U
BERNI Claims	86 E/16	U
JAW Claims	86 K/11	U
RAH, FAR Claims	86 K/14, 15	U
BB Claims	86 K/16	U
A Claims	86 E/9	Ag
DM Claims	86 E/9	Ag Cu
HD Claims	86 E/9	Ag Au Cu
ZAP, ST, MR Claims	86 E/9	Ag Cu
SKI Claims	86 E/9, 86 F/12	Ag Cu
CANOE Claims	86 F/12	Ag U Pb
NOREX MINE	86 F/12	Ag

* For general locations relative to Great Bear Volcano Plutonic Depression see Figures VI-1 and VI-4.

B CLAIMS | Uranium
Mike Brezinski, | 85 K/16
P.O. Box 591, | 62°52'N, 116°15'W
Yellowknife, N.W.T.

REFERENCES
Douglas and Norris (1960).

PROPERTY
B 1-12

LOCATION
The claims (Fig. VI-1) are on the west shore of Marian Lake, about 105 kilometers (65 miles) northwest of Yellowknife.

HISTORY
Many claims were staked in this area following the discovery of uranium on the west side of Marian Lake in 1954 by Kix Uranium Ltd.

The B claims were staked in 1975 and 1976 by M. Brezinski.

DESCRIPTION
The claims cover undifferentiated Archean and Proterozoic granitic rocks to the northeast and Paleozoic sediments to the west. Uranium has been found along fault and fracture zones within the granitic rocks.

CURRENT WORK AND RESULTS
Forth-eight cubic yards of granitic material were trenched on the B5 claim. Two rock samples assayed 0.198% U_3O_8 and 0.538% U_3O_8.

LLO CLAIMS | Uranium
Cleaver Lake Mines Ltd., | 85 N/1
Box 140, | 63°10'N, 116°20'W
Coombs, B.C.

REFERENCES
Douglas and Norris (1960; Lord (1942).

PROPERTY
LLO 1-30

LOCATION
The claims (Fig. VI-1) are 13 kilometers (8 miles) north of Marian Lake, about 130 kilometers (80 miles) northwest of Yellowknife.

HISTORY
The Marian River area was extensively staked following the discovery of uranium in 1954 by Kix Uranium Limited.

The LLO claims were staked in 1975 to cover parts of the original claims, the REX, A and ROSE.

DESCRIPTION
The property is underlain by undifferentiated Archean and Proterozoic granitic rocks (Lord, 1942) cut by quartz-filled fractures mineralized with uranium and hematite.

CURRENT WORK AND RESULTS
Seventy-four cubic yards of rock were excavated from five pits in two areas within a small syenite body. Samples assayed 1.5% and 0.34% U_3O_8 from one area and 3.15% and 0.069% U_3O_8 from the other.

JM CLAIMS | Uranium
Andex Mines Limited, | 85 N/1
305, 543 Granville Street, | 63°12'N, 116°15'W
Vancouver, B.C., V6C 1X8

REFERENCES
Lord (1942)

PROPERTY
24 JM claims.

LOCATION
The JM claims (Fig. VI-1) are 80 miles (130 km) northwesterly of Yellowknife, near Slemon Lake.

HISTORY
JM 1-24 were staked in 1975

DESCRIPTION

The property is mainly underlain by granitic rocks. Two radioactive occurrences are reported; one associated with a syenite dyke, the other with a diabase dyke.

CURRENT WORK AND RESULTS

Trenching and drilling explored the radioactive diabase dyke. Ten holes were drilled.

SUE, DIANNE CLAIMS — Uranium, Copper
Noranda Exploration Co. Ltd., — 85 N/10, 15
P.O. Box 1619, — 63°45'N, 116°52'W
Yellowknife, N.W.T.

REFERENCES

Lord (1942); Richardson *et al.* (1973),

PROPERTY

DIANNE 1-11; SUE 1-7.

LOCATION

The claims (Fig. VI-1) are 190 kilometers (120 miles) northwest of Yellowknife. The Port Radium-Rae winter road is about 45 kilometers (30 miles) southeast of the property.

HISTORY

The SUE-DIANNE claims were staked in 1974 and optioned to Noranda Exploration Company, Limited by L. Cooke and D. Smith. The claims cover a radioactive anomaly located by a government sponsored airborne radiometric survey (Richardson *et al.*, 1973).

DESCRIPTION

Rocks underlying the SUE-DIANNE group that had previously been mapped as feldspar porphyry and feldspar-quartz porphyry (Lord, 1942) are now thought by Noranda's geologists to be a series of welded ash flows that range in composition from rhyolite to dacite. It has been suggested that these flows are intruded by granitic rocks at depth. The volcanic rocks are well jointed and sheared and localized breccia zones exhibit strong hydrothermal alteration in the form of hematization, silicification and potassic enrichment. Pitchblende and its secondary oxidation products form narrow veinlets in shears and joints of the alteration zones. Chalcopyrite, malachite, azurite and magnetite are present.

CURRENT WORK AND RESULTS

Four diamond drill holes totalling 1,879 feet (573 meters) tested anomalies outlined by detailed radiometric and magnetometer surveys. The best intersections were 1.78 oz/ton Ag, 150 ppm U_3O_8, 3.06% Cu and 0.02 oz/ton Au, all over 5 feet (1.5 meters).

JONES CLAIMS — Uranium
Uranerz Exploration & Mining Limited, — 86 C/15
816, 40 University Avenue, — 64°45'N, 116°46'W
Toronto, Ontario M5H 1TN

REFERENCES

Lord (1941, 1942); McGlynn (1964).

PROPERTY

JONES 1-40

LOCATION

The property is 13 kilometers (8 miles) southwest of Grant and Little Crapeau Lakes, about 290 kilometers (180 miles) northwest of Yellowknife (Fig. VI-1).

HISTORY

JONES 1-25 claims were staked in 1975 and JONES 26-40 claims in 1976.

DESCRIPTION

The area is underlain by Aphebian sedimentary and volcanic rocks intruded by granitic rocks and feldspar-quartz porphyries. Extensive migmatite is developed at the contact between the Aphebian sediments and granitic rocks.

CURRENT WORK AND RESULTS

A ground magnetic and radiometric survey outlined two magnetic anomalies, and corresponding radiometric highs, on opposite sides of a major northeast trending fault. The relative positions of these anomalies suggest that they are part of the same zone.

NAGA CLAIMS — Uranium
Noranda Exploration Co. Ltd., — 86 E/3
P.O. Box 1619, — 65°13'N, 119°15'W
Yellowknife, N.W.T.

REFERENCES

McGlynn (1977)

PROPERTY

NAGA 1-105

LOCATION

The property is at Naga Lake on Leith Peninsula, which projects into Great Bear Lake, about 400 kilometers (250 miles) north-northwest of Yellowknife (Fig. VI-1).

HISTORY

The claims were staked in September, 1975 when a ground radiometric survey outlined a 5,000-foot (1,524 meter) long, 1,200-foot (366 meter) wide, southeast trending anomaly having greater than 3,000 cpm radioactivity. Several soil samples assayed up to 0.7 lbs/ton U_3O_8.

DESCRIPTION

The bedrock is Aphebian metasedimentary and metavolcanic rocks intruded by feldspar porphyries and granitic rocks and overlain by Helikian sedimentary rocks of the Hornby Bay Group and Cambrian sedimentary rocks of the Old Fort Island Formation.

CURRENT WORK AND RESULTS

Ground radiometric, EM, seismic, magnetic, radon emanometer and track-etch surveys explored the property.

Eleven holes totalling 2,271 feet (692 meters) tested the radioactive anomaly outlined in 1975. Five of the holes were radiometrically probed and drill cores assayed for U_3O_8, Cu, Ag, Au, Zn and Ni. The strongest radioactivity was confined to the overburden, suggesting that the anomaly is a surficial feature. The highest assay was 23.9 ppm U_3O_8 over 2.5 feet (0.8 meters). Fine-grained, disseminated pyrite ranging from less than 0.5% to 1.5% was found throughout the core and minor, coarse blebs of disseminated chalcopyrite are present in an arkosic fanglomerate unit. The highest copper assay was 200 ppm over 2.5 feet (0.8 meters).

PROSPECTING PERMITS 387-392
Noranda Exploration Co. Ltd.,
P.O. Box 1619,
Yellowknife, N.W.T.

Uranium, Copper, Silver
86 E/3,4,6,7,10,11
65°00' - 65°45'N
118°30' - 120°00'W

REFERENCES
Balkwill (1971); McGlynn (1977)

PROPERTY
Prospecting Permits 387, 388, 389, 390, 391, 392.

LOCATION
The permits are on Leith Peninsula about 400 kilometers (250 miles) north-northwest of Yellowknife (Fig. VI-1).

HISTORY
Prospecting Permits 387-392 were acquired by Noranda Exploration Company Ltd. in 1976 to cover 200 radioactive anomalies outlined by an airborne geophysical survey in 1975.

DESCRIPTION
Aphebian granite, Helikian sediments of the Hornby Bay Group intruded by gabbro sills and dykes, and Cambrian sediments of the Old Fort Island, Saline River and Mount Cap Formations underlie the permits.

CURRENT WORK AND RESULTS
Geological mapping at a scale of 1 inch to 0.5 miles, prospecting, 3,849 feet (1,173 meters) of diamond drilling in 7 holes, and a ground radiometric survey explored the permits. About 80% of the radioactive anomalies are over granitic rocks, the rest are over sediments of the Hornby Bay Group and Old Fort Island Formation.

Copper and silver were found in conglomerates at the base of the Old Fort Island Formation and at a stromatolitic dolomite-sandstones contact in the Hornby Bay Group.

LEITH CLAIMS
Noranda Exploration Co. Ltd.,
P.O. Box 1619,
Yellowknife, N.W.T.

Uranium
86 E/6
65°20'N, 119°15'W

REFERENCES
McGlynn (1977)

PROPERTY
LEITH 1-45

LOCATION
The property lies on Leith Peninsula, just south of Great Bear Lake (Fig. VI-1) about 400 kilometers (250 miles) north-northwest of Yellowknife.

HISTORY
The claims were staked in 1975 to cover an airborne radiometric anomaly.

DESCRIPTION
Underlying the claims are Aphebian metasedimentary and metavolcanic rocks unconformably overlain by Helikian sandstones and shales of the Hornby Bay Group.

CURRENT WORK AND RESULTS
Geological mapping at a scale of 1 inch to 400 feet, geochemical chip and soil sampling, ground radiometric surveying, radon emanometer surveying and 1,556 feet (474 meters) of diamond drilling in four holes were completed.

Radioactivity is confined to a green feldspathic sandstone and its altered hematitic equivalent and green and red shales, all of the Hornby Bay Group.

YETA CLAIMS
Noranda Exploration Co. Ltd.,
P.O. Box 1619,
Yellowknife, N.W.T.

Uranium
86 E/6, 7, 10, 11
65°30'N, 119°00'W

REFERENCES
McGlynn (1977)

PROPERTY
YETA 1-132

LOCATION
The property is near Spearhead Lake on Leith Peninsula (Fig. VI-1), south of Great Bear Lake, about 400 kilometers (250 miles) north-northwest of Yellowknife.

HISTORY
The claims were staked in 1975 to cover an airborne radiometric anomaly.

DESCRIPTION
The underlying rocks are Aphebian metasedimentary and metavolcanic rocks intruded by granite and feldspar porphyries and overlain unconformably by sediments of the Helikian Hornby Bay Group and the Cambrian Old Fort Island, Saline River and Mount Cap Formations.

CURRENT WORK AND RESULTS
Geological mapping at a scale of 1 inch to 0.5 miles, ground radiometric surveying and lake sediment and water sampling were completed. Four holes, totalling 2,318 feet (707 meters) were drilled.

BERNI CLAIMS
Uranerz Exploration and Mining Limited,
102, 140-1st Avenue,
Calgary, Alberta.

Uranium
86 E/16
65°45'N, 118°00'W

REFERENCES
Hoffman *et al.* (1976)

PROPERTY
BERNI 1-8

LOCATION
The property is in the Conjuror Bay area on Great Bear Lake, about 400 kilometers (250 miles) northwest of Yellowknife.

HISTORY
The claims were staked in July, 1975 for Uranerz Exploration and Mining Limited to cover an airborne anomaly detected by an airborne radiometric survey.

DESCRIPTION
The BERNI claims are underlain by Aphebian intermediate and basic lavas, ignimbrites and air-fall tuffs intruded by quartz-feldspar porphyry (Hoffman *et al.*, 1976).

Minute fractures within the porphyry contain uranium.

CURRENT WORK AND RESULTS

The property was geologically mapped at 1:15,000 and radiometrically surveyed. Thirty-nine grab samples of the highly radioactive quartz-feldspar porphyry assayed less than 200 ppm U_3O_8.

JAW CLAIMS | Uranium
Denison Mines Limited, | 86 K/11
Royal Bank Plaza, | 66°32'N, 117°20'W
P.O. Box 40,
Suite 3900, South Tower,
Toronto, Ontario, M5J 2K2.

REFERENCES

Hoffman and Bell (1975); Hoffman *et al.* (1976, 1978b); Hoffman and McGlynn (1977); Hornbrook *et al.* (1976).

PROPERTY

JAW 1-12

LOCATION

The claims are 295 miles (475 km) north-northwest of Yellowknife (Figs. VI-1 and 4) and three miles (5 km) north of the Sloan River.

HISTORY

The claims are underlain by granodiorite intruded by granite dykes and two small mafic dykes. A zone of mylonite and brecciation trends northeast through the center of the claims.

CURRENT WORK AND RESULTS

A radiometric survey recorded slightly more radioactivity over the granite dykes than the granodiorite. One rock chip and a few lake sediment samples were taken in an attempt to locate the anomaly found by the Geological Survey of Canada.

FAR AND RAH CLAIMS | Uranium
Cominco Ltd., | 86 K/14, 15
200, Granville Square, | 66°48'N, 117°00'W
Vancouver, B.C., V6C 2R2

REFERENCES

Hoffman and Bell (1975); Hoffman (1978); Hoffman *et al.* (1976, 1978b).

PROPERTY

FAR 1-110; RAH 1-103

LOCATION

The adjoining FAR and RAH claims are 310 miles (510 km) north-northwesterly of Yellowknife and 50 miles (80 km) northeasterly of Port Radium.

HISTORY

Regional lake water sampling by Cominco in 1974 and 1975 detected several anomalies near a northeasterly striking fault zone. While prospecting this zone in 1976 a uranium occurrence was discovered. The RAH and FAR claims were staked to cover the showing on RAH 10 and about 19 miles of the fault zone.

DESCRIPTION

The property covers a narrow graben (Fig. VI-5) containing Helikian Hornby Bay Group sandstones and conglomerates, flanked by late Aphebian Sloan River volcanics, by biotite granite of the Great Bear Batholith and minor intrusive plagioclase-hornblende porphyry. The graben developed along and adjacent to a pre-existing dextral strike slip fault. The flanking volcanics are mainly felsic to intermediate ignimbrites and lavas and are interbedded with minor sediments.

On the RAH showing northeasterly and westerly to northwesterly striking fractures cut biotite granite and are locally mineralized with pitchblende and coffinite. The northwesterly fracture set contains most of the uranium mineralization. The fractures are commonly filled with quartz where uranium minerals are absent and are locally coincident with hematitic shear planes.

CURRENT WORK AND RESULTS

A triangular area 650 by 250 meters was mapped at one inch to ten meters on the south side of the graben. This area covers the RAH peninsula and the RAH showing at the peninsula's northeastern end. A sandstone dyke probably derived from previously overlying but now eroded Helikian sediments was mapped.

A radiometric survey over the area of detailed mapping outlined 11 anomalies. Two of these anomalous areas were covered by detailed radiometric surveys.

Eight trenches were excavated, exposing fractures with encouraging uranium contents. The northwesterly striking uranium bearing fractures show an 'en echelon' pattern. Possibly the mineralized fractures were caused by tension during dextral strike slip movement on the nearby fault zone.

BB CLAIMS | Uranium
Imperial Oil Limited, | 86 K/16
111, St. Clair Avenue W, | 66°55'N, 116°08'W
Toronto, Ontario, M5W 1K3

REFERENCES

Durham and Cameron (1975); Hoffman and Bell (1975); Hoffman *et al.* (1976, 1978).

PROPERTY

BB 1-16.

LOCATION

BB 1-16 are 310 miles (500 km) north-northwesterly of Yellowknife, and just north of the Coppermine River (Fig. VI-1).

HISTORY

The claims were acquired by Imperial Oil in 1976 to cover a lake sediment uranium-copper anomaly, detected by the Geological Survey of Canada (Durham and Cameron, 1975).

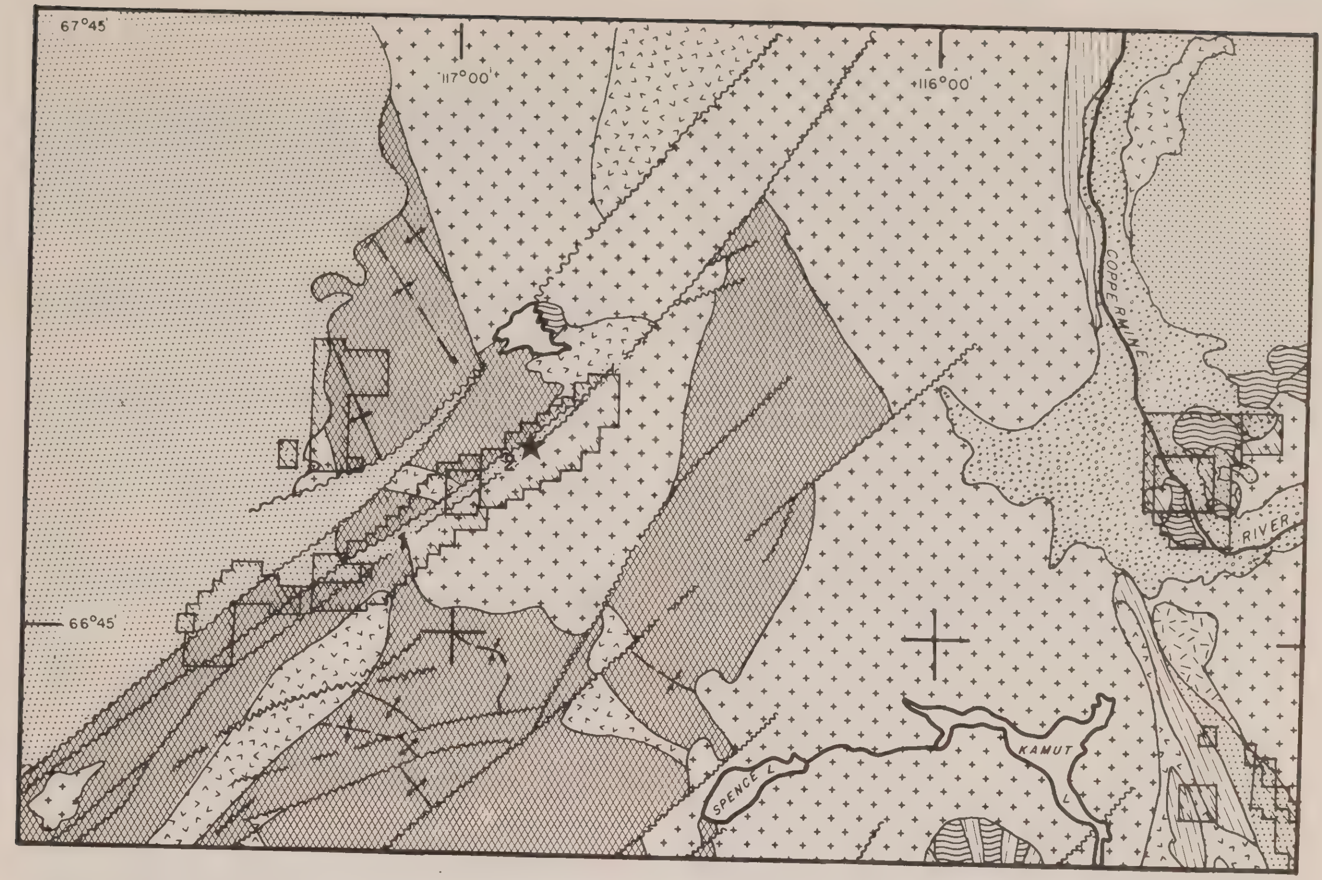
DESCRIPTION

The property is underlain by Aphebian granitic rocks of the Saint Germain pluton, Aphebian, rhyolite and basalt of the Dumas Group (Hoffman, 1978, c) and Helikian basal conglomerate and sandstone of the Hornby Bay Group. The Helikian sediments unconformably overly the Aphebian rocks and are preserved in valleys and depressions. Regolith is locally exposed along the Helikian unconformity.

Anomalously high radioactivity was found in three places in the northeastern part of the claim block in Hornby Bay Group basal conglomerate near the Aphebian - Helikian unconformity.

CURRENT WORK AND RESULTS

The claims were mapped and prospected. Lake and stream sediments were sampled on and adjacent to the



RECENT

Surficial deposits along Coppermine River

HELIKIAN
Hornby Bay Group

Quartz arenite; conglomerate and red beds - Talus breccia near Coppermine River

APHEBIAN
Great Bear Batholith

Diorite and tonalite

Granitic rocks - mainly coarse grained biotite granite. Minor granodiorite

McTavish Volcanics

Intrusive porphyry (Gagne and Harrison porphyries)

S Dumas Group - Ignimbrites: Rhyolite - quartz latite and (S) sediments

Sloan Group - Mainly felsic to intermediate ignimbrites

Claims staked in 1976 or earlier. 1. FAR Group 2. RAH Group

★ Uranium occurrences

Figure VI-5: Properties and regional geology, simplified from Hoffman (1978, c). Northern part of NTS 86 K.

BB claims and two parts of the property were tested by Track Etch surveys.

The cause of the high uranium content of BB Lake, in the centre of the claim group was not discovered.

A CLAIMS | Silver
Terra Mining and Exploration Co. Ltd., | 86 E/9
204, 8631-109 Street, | 65°35'N, 118°05'W
Edmonton, Alberta, T6G 1E8

REFERENCES
Gibbins *et al.* (1977); Hoffman *et al.* (1976); Seaton (1978); Shegelski and Murphy (1972).

PROPERTY
A 11, 25-37.

LOCATION
The claims are northeast of Terra Mine, on the north shore of Camsell River, about 400 kilometers (250 miles) northwest of Yellowknife (Figs. II-7 and VI-1).

HISTORY
The area has had a long history of prospecting and exploration since native silver was first discovered in 1932.

The A 1-24 claims, originally the YAW claims, were staked in 1966 for Silver Bear Mines Limited, a wholly owned subsidiary of Terra Mining and Exploration Company Limited. A 25-38 claims were staked in 1972 for Norex Resources Limited. Terra Mining and Exploration Company Limited acquired 50% interest in these claims.

DESCRIPTION
The claims are underlain by Aphebian intermediate and mafic lavas and air-fall tuffs (Hoffman *et al.*, 1976).

CURRENT WORK AND RESULTS
The best intersection in a 1,010-foot (310 meter) hole drilled on the property assayed 4.2 oz/ton silver over 1.0 foot (0.3 meters).

DM CLAIMS | Silver, Copper
Sunshine Mining Company, | 86 E/9
P.O. Box 1080, | 65°40'N, 118°02'W
Kellogg, Idaho.

REFERENCES
Hoffman *et al.* (1976); Murphy and Shegelski (1972).

PROPERTY
DM 1-9

LOCATION
DM 1-9 are in the Conjuror Bay area, on Great Bear Lake, about 400 kilometers (250 miles) northwest of Yellowknife (Figs. II-7 and VI-1).

HISTORY
The claims were staked in 1975.

DESCRIPTION
The property is underlain by Aphebian intermediate and basic lavas and air-fall tuffs intruded by a syenite-monzonite complex (Hoffman *et al.*, 1976).

CURRENT WORK AND RESULTS
The property was geologically mapped at a scale of 1 inch to 500 feet. Ground radiometric, magnetic and EM surveys did not find any strong anomalies or conductors. The work was performed in joint venture with Terra Mining and Exploration Company Limited.

ZAP, ST, MR CLAIMS | Silver, Copper
Sunshine Mining Company, | 86 E/9
P.O. Box 1080, | 65°38'N, 118°06'W
Kellogg, Idaho.

REFERENCES
Gibbins *et al.* (1977); Hoffman *et al.* (1976); Shegelski and Murphy (1972).

PROPERTY
MR 7, 8, 13-15; ST 2, 6-9; ZAP 1, 2.

LOCATION
The claim groups are in the Conjuror Bay area, Great Bear Lake, about 400 kilometers (250 miles) northwest of Yellowknife (Fig. II-6).

HISTORY
The MR claims were staked in 1970 for Saco Mining Corporation Limited, the ST claims in 1975 for Terra Mining and Exploration Company Limited and the ZAP claims in 1972 for Terra Mining and Exploration Company Limited. Sunshine, Terra and Saco were partners in a joint venture in 1976.

DESCRIPTION
The area is underlain by Aphebian ignimbrites and mafic lavas with minor sandstones; rhyolite plug domes; silicified mudstones, sandstone and rhyolite lavas; and intermediate and mafic lavas and air-fall tuffs (unit 3, 4, 6 and 7 of Fig. 76.2, Hoffman *et al.*, 1976). The supracrustal rocks are intruded by a syenodiorite-syenite complex.

CURRENT WORK AND RESULTS
Geological mapping at a scale of 1 inch to 500 feet and ground magnetic, EM and radiometric surveys outlined a conductor with a magnetic expression and magnetic anomalies thought to be caused by magnetic pods and disseminated magnetite.

SKI CLAIMS | Silver, Copper
Sunshine Mining Company, | 86 E/9, 86 F/12
P.O. Box 1080, | 65°30'N, 118°00'W
Kellogg, Idaho 83837.

REFERENCES
Hoffman *et al.* (1976); Lord and Parsons (1952).

PROPERTY
SKI 1-19

LOCATION
The property is south of Rainy Lake, about 395 kilometers (245 miles) northwest of Yellowknife (Fig. II-7).

HISTORY
The SKI claims were staked in 1976.

DESCRIPTION
The property is underlain by silicified mudstone, sandstone, lavas and air-fall tuffs intruded by a plagioclase-hornblende porphyry and a syenite-syenodiorite complex (Hoffman *et al.*, 1976).

CURRENT WORK AND RESULTS

Sunshine Mining in a joint venture with Terra Mining and Exploration Co. Ltd. geologically mapped the area at a scale of 1 inch to 500 feet. An airborne EM, magnetic and spectrometer survey outlined numerous anomalies. Ground follow-up delineated five small magnetic anomalies, thirteen conductors, one large and several small radiometric anomalies.

Seventy-four soil and rock samples collected over four of the anomalies were assayed for copper, lead, zinc, silver, cobalt, nickel, mercury and arsenic.

CANOE CLAIMS	Lead, Silver
Sunshine Mining Company,	86 F/12
P.O. Box 1080,	65°34'N, 117°45'W
Kellogg, Idaho.	

REFERENCES

Hoffman *et al.* (1976); McGlynn (1975); Padgham *et al.* (1974).

PROPERTY

CANOE 1-8

LOCATION

The property is on Clut Island, about 400 kilometers (250 miles) north-northwest of Yellowknife (Fig. II-7).

HISTORY

The CANOE claims were staked in July, 1975 to cover two quartz veins on which trenches expose copper-silver mineralization.

DESCRIPTION

The country rocks are Aphebian intermediate lavas and tuffs, sandy tuffs and tuffaceous sandstones crosscut by granite dykes. Fault zones containing mineralized quartz veins cut the rocks (Padgham *et al.*, 1974).

CURRENT WORK AND RESULTS

Geological mapping at a scale of 1 inch to 1,250 feet and 1 inch to 500 feet and radiometric and EM surveys outlined a narrow radiometric anomaly 100 feet (30 meters) west of the quartz vein. The work was done by Sunshine Mining in a joint venture with Terra Mining and Exploration Company Limited.

NOREX MINE	Silver
Terra Mining and Exploration Company Limited,	86 F/12
Suite 204, 8631-109 Street,	65°35'N, 117°57'W
Edmonton, Alberta, T6G 1E8	

REFERENCES

Hoffman *et al.* (1976); Kidd (1936); Lord (1951); Lord and Parsons (1952); Padgham, Kennedy *et al.* (1975); Padgham, Shegelski *et al.* (1974); Parsons (1948); Thorpe (1972a).

PROPERTY

ITLDO 1-13

LOCATION

The property is on the south shore of Silver Bay, part of the Camsell River, 396 kilometers (246 miles) northwest of Yellowknife (Fig. II-7).

HISTORY

In 1932 the ELITE claims were staked to cover silver showings for A.X. Syndicate. In 1933 White Eagle Silver Mines Ltd. acquired the ELITE claims and six other claim groups from the syndicate. The ground was restaked in 1945 and 1946 as the F and H claim groups for Camsell River Silver Mines Limited and by Caesar Silver Mines Limited in 1967. Ten holes, totalling 1,521 feet (464 meters) were drilled on the main (Graham) vein. The best intersections were 2,458.3 oz/ton Ag over 3 inches (0.06 meters) and 355.7 oz/ton Ag over two feet (0.6 meters), 916.2 oz/ton Ag over 2.5 feet (0.8 meters) and 355.7 oz/ton Ag over 8 feet (2.4 meters). An adit and raise indicated about 2,000 tons of high grade silver recoverbble by open pit. In 1969 the property was optioned to Norex Uranium Limited which later became Norex Resources Limited, and in 1970 a 50 ton per day mill was constructed and open pit mining commenced. About 5,181 tons of rock were mined and 700 tons milled. In 1971 about 500 tons of rock were milled at Norex Mill, 975 tons grading 59.25 oz/ton Ag were milled at Echo Bay and another 2,500 tons containing about 250,000 ounces of silver stock piled. In 1972 Terra Mining and Exploration Company Limited acquired a 50% interest in the property and in 1973 1,168 tons of the stock pile was treated at Terra's 175 t.p.d. mill. A 1,500-foot 15% decline started in 1971 in order to intersect the Graham vein had advanced 300 feet by 1974.

DESCRIPTION

The country rocks are Aphebian intermediate and mafic lavas and air-fall tuffs (Hoffman *et al.*, 1976). East-southeast trending fractures containing 0.5-inch (1.3 cm) to 12-inch (30.5 cm) wide quartz-carbonate veins cut a 300-foot (90 meter) wide zone of altered rock within a 500-foot (152 meter) wide belt of rock interpreted as a quartz-latite porphyry by Kidd (1936) but more recently considered as an altered and recrystallized andesite flow-tuff sequence by Murphy and Shegelski (1972) and Padgham, Shegelski *et al.* (1974). Vein minerals include silver, argentite, chalcopyrite, galena, spahlerite, safflorite, rammelsbergite, native bismuth and a bismuth arsenide. Most of the silver is near a six-foot wide diabase dyke crosscutting both the andesite and fractures.

CURRENT WORK AND RESULTS

The road between Terra Mine and the Norex property was completed during the year. The decline haulageway was advanced about 1,160 feet (354 meters) bringing it 220 feet (67 meters) below surface and 247 feet (75 meters) from the Graham vein.

HEPBURN METAMORPHIC - PLUTONIC BELT

The northern part of the Hepburn Metamorphic - Plutonic Belt, comprises Epworth Group metamorphic rocks of the internal zone of the Coronation Geosyncline; metabasalt, metafelsite and pelitic metasediments of the Akaitcho Group; and plutons of the Hepburn Batholith, a discordant magmatic intrusive complex (Hoffman *et al.*, 1978). The southern part of the belt is not well known, but includes rocks of the Epworth and Akaitcho Groups, as well as Snare Group metasediments and metavolcanics whose relationship to the Epworth and Akaitcho Group rocks is uncertain. Plutons of the Hepburn Batholith intrude all three Groups. Two periods of deformation have been recognized, one of which is younger than the Hepburn Batholith.

The Hepburn Metamorphic - Plutonic Belt is

flanked on the west by the Great Bear Volcano-Plutonic Depression; the contact except north of latitude 66° being the Wopmay Fault. The northern part of the Hepburn Metamorphic-Plutonic Belt is bounded to the east by the Cloos Anticline (Fig. VII-4) and is unconformably overlain to the north by Helikian sediments of the Amundsen Basin. The southern part of the Belt is flanked on the east side by a five to ten mile wide zone of relatively unmetamorphosed Snare Group sediments, east of which are Archean rocks of the Slave Province. The Hepburn Metamorphic - Plutonic Belt has been little explored. Current exploration is for uranium in areas marginal to the Belt, and apart from work on properties listed in Table VI-5 includes mapping by Cominco Limited near Scotstown and Irritation Lakes.

TABLE VI-5: Properties Explored in the Hepburn Metamorphic-Plutonic Belt in 1976

NAME	NTS*	COMMODITY
QUAT Claims	86 J/4	U
KUM Claims	86 J/5	U
Prospecting Permits:		
407, 408	86 J/4, 5	U
393, 394	86 J/13, 14	U

* For general locations relative to Hepburn Metamorphic - Plutonic Belt see Figures VI-1 and 4.

QUAT CLAIMS — Uranium
Cominco Limited, — 86 J/4
Yellowknife, N.W.T. — 66°13'N, 115°32'W

REFERENCES
Craig *et al.* (1960); Hoffman (1972); Hoffman *et al.* (1978); McGlynn (1977).

PROPERTY
QUAT 1-24

LOCATION
The claims (Fig. VI-4) are east of Belleau Lake, about 80 kilometers (50 miles) east of Port Radium and 430 kilometers (265 miles) north-northwest of Yellowknife.

HISTORY
The QUAT claims were staked in 1975 for Cominco Limited.

DESCRIPTION
The claim group is underlain by Aphebian muscovite and biotite schists, amphibolite and intercalated metavolcanics and pelites, all designated by Hoffman *et al.* 1978 as part of the Akaitcho Group.

CURRENT WORK AND RESULTS
The property was geologically mapped at a scale of 1 inch to 1,000 feet, trenched and radiometrically surveyed. A pit and trench gave values of 4.51 lbs. U_3O_8/ton over 1.0 feet (0.3 meters) and less than 0.20 lbs. U_3O_8/ton respectively. Gold and silver values ranged from nil to 0.004 oz/ton and nil to 0.15 oz/ton respectively.

KUM — Uranium
Cominco Limited, — 86 J/5
Yellowknife, N.W.T. — 66°15'N, 116°00'W

REFERENCES
Craig *et al.* (1960); Hoffman *et al.* (1978); McGlynn (1977).

PROPERTY
KUM 1-53

LOCATION
The claims (Fig. VI-4) are at Belleau Lake, about 80 kilometers (50 miles) east of Port Radium and 432 kilometers (268 miles) north-northwest of Yellowknife.

HISTORY
The property was originally staked as the U.O. group and was optioned in 1961 to Ridley Mines Holdings Ltd. who did minor amounts of trenching. The property was restaked in 1968 as the TCO claims by Trans-Canada Resources and abandoned in 1970 after an airborne EM and magnetic survey, geological mapping, ground radiometric surveying and trenching had tested the ground. In 1975 Cominco re-sampled the old pits and staked the KUM claims.

DESCRIPTION
The claim group is underlain by Aphebian interbedded volcanics and pelites, migmatites and granitoid gneiss, all designated by Hoffman *et al.*, 1978 as part of the Akaitcho Group.

CURRENT WORK AND RESULTS
The property was prospected and geologically mapped at a scale of 1 inch = 2,000 feet. An EM and radiometric survey outlined a series of strong radioactive anomalies along, and an EM anomaly west of, a fault zone. Five trenches and four pits were excavated. The best assay was 1.47 kg U_3O_8/ton over 2.74 m (9 feet).

PROSPECTING PERMITS 407, 408 — Uranium
Cominco Limited, — 86 J/4, 5
200, Granville Square, — 66°00' - 66°30'N
Vancouver, B.C., V6C 2R2 — 115°30' - 116°00'W

REFERENCES
Craig *et al.* (1960); Hoffman (1972); Hoffman *et al.* (1978); McGlynn (1977).

PROPERTY
Prospecting Permits 407, 408.

LOCATION
The permits (Fig. VI-4) are at Belleau and Wentzel Lakes about 435 kilometers (270 miles) north of Yellowknife.

HISTORY
Cominco Limited acquired Prospecting Permits 407 and 408 in 1976 after they discovered uranium on the QUAT and KUM claims in 1975.

DESCRIPTION
The area (Fig. VI-4) is underlain by Aphebian intercalated metavolcanics and pelites, migmatites, muscovite and biotite schists and gneisses of the Akaitcho Group (Hoffman *et al.*, 1978); massive and gneissic granitoid rocks of the Hepburn Batholith; and a graben of Helikian sediments of the Hornby Bay Group.

CURRENT WORK AND RESULTS
The permits were geologically mapped at a scale of 1 inch to 0.5 miles. Airborne radiometric and magnetic surveys outlined 125 anomalies.

PROSPECTING PERMITS 393, 394 | Uranium, Copper
BP Minerals Limited, | 86 J/13, 14
Suite 212, 25 Adelaide St.E., | 66°45' - 67°00'N
Toronto, Ontario, M5C 1Y2 | 115°00' - 116°00'W

REFERENCES
Craig *et al.* (1960); Hoffman *et al.* (1978); McGlynn (1977).

PROPERTY
Prospecting Permit 393, 394

LOCATION
The permits (Fig. VI-4) are about 50 kilometers (30 miles) northwest of Hepburn Lake, 460 kilometers (285 miles) north of Yellowknife.

HISTORY
Prospecting Permits 393 and 394 were acquired by BP Minerals Limited in 1976.

DESCRIPTION
Aphebian massive and gneissic granitoid rocks, amphibolite and paragneiss of the Hepburn Batholith; felsites and granitoid rocks of the Great Bear Volcano-Plutonic Depression (Hoffman *et al.*, 1978); Helikian sandstone and conglomerate of the Hornby Bay Group; and mafic and ultramafic rocks of the Muskox Intrusion underlie the claims.

CURRENT WORK AND RESULTS
The permits were geologically mapped at a scale of 1 inch to 1 mile. Soil and lake sediments were sampled for uranium, copper, nickel, lead, cobalt, molybdenum and manganese. Eight anomalies, mainly copper and uranium, were outlined on Prospecting Permit 393 and five base metal anomalies on Prospecting Permit 394.

AMUNDSEN BASIN

TABLE VI-6: Properties and Projects in the Amundsen Basin in 1975

NAME	NTS*	COMMODITY
Hornby-Dease Project	86 L/7,8,10,14	U
Prospecting Permits: 310, 311, 312	86 N/2,3,4,	U
DIS	86 N/5	U
Prospecting Permit 316	86 N/6	U
PEC Claims	86 N/6	U
YUK Claims	86 N/6	U
BRUCE, JEFF, MIKE, ROD, TIM	86 N/7	U

* For general locations relative to Amundsen Basin see Figures VI-1 and 5.

The Amundsen Basin is filled with Helikian sediments. The Paleohelikian Hornby Bay group, though generally dipping gently northwards, shows much local variation in dip direction. The overlying Neohelikian sediments and volcanics are exposed as a northerly dipping homocline. The volcanics termed the Copper Creek Formation are underlain and overlain by sedimentary formations. The Copper Creek Formation which is composed almost entirely of subareal basalt flows (Baragar and Donaldson, 1973) was intensively explored in the late 1960's for fracture controlled copper mineralization (Thorpe, 1970; Kindle, 1972). The target now is uranium in the underlying Dismal Lakes and Hornby Bay Groups. These Groups contain two units of sandstone and minor conglomerate which are separated by dolomite, sandstone, siltstone and shale (Baragar and Donaldson, 1973). The Dismal Lakes Group comprises a basal unit of sandstone and intercalated black shale succeeded by red mudstone and dolomite.

Interest in the Hornby Bay Group stems from the discovery in 1969 of uranium and the staking of the PEC group, south of Dismal Lakes by the Aquitaine Company of Canada Ltd. Later, Imperial Oil Limited staked trains of radioactive erratics. Aphebian granitic rocks immediately underlying the basal unconformity of the Hornby Bay Group have been deeply weathered.

PROSPECTING PERMITS 310, 311, 312 | Uranium, Copper
BP Minerals Limited, | 86 N/2, 3, 4
Suite 212, 25 Adelaide St.E., | 67°07' - 67°15'N
Toronto, Ontario M5C 1Y2 | 116°30' - 117°45'W

REFERENCES
Baragar and Donaldson (1973); Gibbins *et al.* (1977); Hoffman *et al.* (1978).

PROPERTY
Prospecting Permits 310, 311, 312.

LOCATION
The permits are south of Dismal Lakes (Fig. VI-6) about 530 kilometers (330 miles) northwest of Yellowknife.

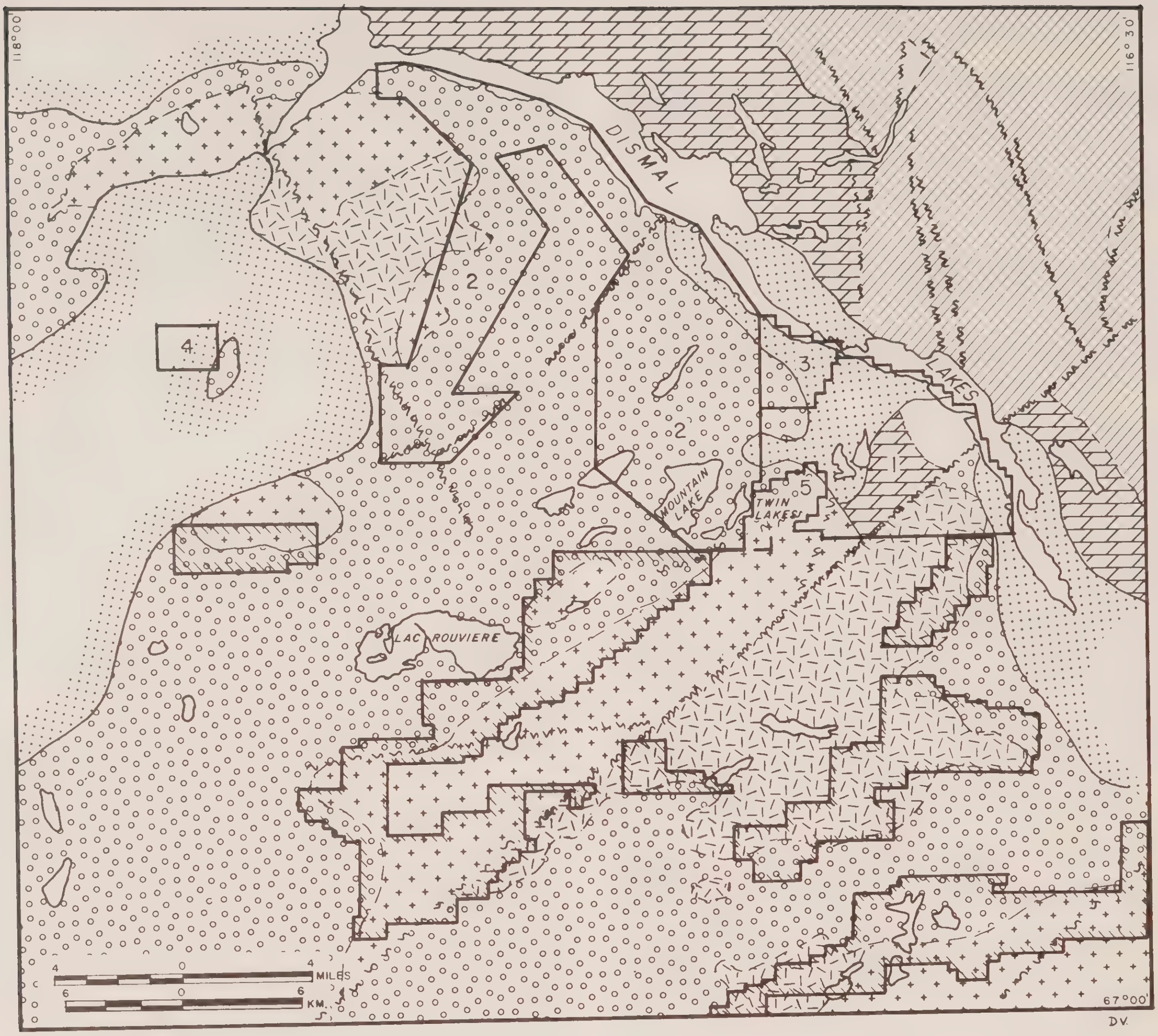
HISTORY
In 1969 Aquitaine Company of Canada Limited discovered uranium in the area and staked the PEC claims. In 1972 Imperial Oil Limited discovered radioactive boulders north of Aquitaine's property and staked the YUK claims. In 1973 BP Minerals Limited was granted Prospecting Permits 310, 311 and 312 to the south of the PEC claims.

DESCRIPTION
The areas are underlain by Helikian sediments of the Hornby Bay Group and by an inlier of late Aphebian granitic rocks and felsites related to Great Bear Volcano-Plutonic Depression (Hoffman *et al.*, 1978). All the strata are cut by the northeast-striking Teshierpi Fault (Fig. VI-6).

CURRENT WORK AND RESULTS
The permits were geologically mapped at a scale of 1 inch to 1 mile, radiometrically prospected and soil and stream sediment sampled for uranium, copper, lead, nickel, cobalt, and molybdenum. Eight geochemical anomalies, mainly uranium and copper, were found. A track-etch survey outlined three anomalies on Prospecting Permit 311, two of which correspond with high uranium values in soil samples.

DIS CLAIMS | Uranium
Noranda Exploration Co. Ltd., | 86 N/5
P.O. Box 1619, | 69°22'N, 117°45'W
Yellowknife, N.W.T.

REFERENCES
Baragar and Donaldson (1973); Durham and Cameron (1975).



LEGEND

[pattern]	Glacial Drift
[pattern]	Copper Creek Formation - basalt flows, intercalated sandstone.
[pattern]	Dismal Lakes Group - mainly dolomite, minor sandstone and shale.
[pattern]	Hornby Bay Group - sandstone, siltstone, shale, conglomerate, dolomite.
[pattern]	Porphyritic Felsite - Great Bear - Volcano-Plutonic - Depression
[pattern]	Granites (Hoffman *et al.*, 1978)

PROPERTIES

1. YUK - Imperial Oil Ltd.
2. P.P. 316 - Imperial Oil Ltd.
3. BRUCE, JEFF, MIKE, TIM, ROD - B.P. Minerals Ltd.
4. DIS - Noranda Exploration Company Ltd.
5. PEC - Aquitaine Company of Canada Ltd.

[pattern] Claims maintained by BP after relinquishing P.P.s 310, 311, 312.

Figure VI-6: Location of properties in the Dismal Lakes area. Geology simplified from Baragar and Donaldson, 1973.

PROPERTY
DIS 1-70

LOCATION
The DIS claims are 355 miles (560 km) north-northwesterly of Yellowknife and 75 miles (120 km) west-southwest of Coppermine.

HISTORY
The DIS claims (Fig. VI-6) were staked late in 1975 to cover a hydrogeochemical uranium anomaly found by a reconnaissance survey (Durham and Cameron, 1975).

DESCRIPTION
The claims lie in the eastern edge of a north trending zone of drumlins. Glacial striae east of the claims indicate ice movement from the southeast. DIS 1-70 are underlain by glacial sediments, including locally derived boulder fields of dolomite, conglomerate and arkose of units 8 and 9 of the Hornby Bay Group (Baragar and Donaldson, 1973). Dolomite boulders predominate over much of the southeastern part of the property.

CURRENT WORK AND RESULTS
A combined geological and radiometric survey totalling about 100 traverse miles covered the claims. Boulder fields were mapped and the degree of radioactivity of individual boulders determined. Granite and sandstone boulders gave the highest average readings.

PROSPECTING PERMIT 316	Uranium
Imperial Oil Limited,	86 N/6
111, St. Clair Ave. W.,	67°16'N, 117°06'W
Toronto, Ontario M5W 1K3	

REFERENCES
Baragar and Donaldson (1973); Seaton (1978).

PROPERTY
Prospecting Permit 316

LOCATION
The permit area is north of Mountain Lake and south of Dismal Lakes (Fig. VI-6) about 500 kilometers (340 miles) north of Yellowknife.

HISTORY
The PEC claims were staked by Aquitaine Company of Canada in 1969 to cover a uranium showing, found after an airborne radiometric survey in 1968. Imperial Oil Limited discovered radioactive boulders to the north of Aquitaine's property and staked the YUK claims in 1972.

In 1974 Imperial Oil Limited acquired Prospecting Permit 316 to cover an area west of the YUK and PEC claims and had a radiometric survey flown over the area.

DESCRIPTION
Clastics and carbonates of the Helikian Dismal Lakes and Hornby Bay Groups and Aphebian granitic and volcanic rocks underlie the permit area (Fig. VI-6). Uranium occurs in quartzose sandstone and conglomerate of the Hornby Bay Group.

CURRENT WORK AND RESULTS
Thirty-one anomalies outlined in 1974 by an airborne spectrometer survey were radiometrically surveyed. A fan-shaped, east-trending radioactive boulder train was discovered near the east shore of North Twin Lake (Fig. VI-6). The boulders were impure quartzose-sandstones and locally contain disseminated pyrite and trace amounts of chalcopyrite and malachite.

Lake water and lake sediment samples gave two high uranium values south of Twin Lakes and several high copper values north of Mountain Lake.

PEC CLAIMS	Uranium
Aquitaine Company of Canada Limited,	86 N/7
200, Aquitaine Tower,	67°16'N, 116°55'W
540, 5th Avenue S.W.,	
Calgary, Alberta.	

REFERENCES
Baragar and Donaldson (1973); Seaton (1978).

PROPERTY
PEC 1-12, 14-24, 26, 28, 32-54, 60-64, 69-73, 76-78, 100-102.

LOCATION
The property (Fig. VI-6) lies east of Mountain Lake and south of Dismal Lakes, about 65 miles southwest of Coppermine.

HISTORY
The PEC claims were staked in 1969 to cover a uranium showing discovered by ground follow-up of a radiometric survey flown for Aquitaine Company of Canada Limited in 1968. This was followed by geological mapping, detailed airborne radiometric surveying, prospecting and claim staking in 1970.

In 1975 geological mapping, diamond drilling, ground radiometric and VLF EM surveying, lake and water sampling, and a radon soil survey outlined two uranium showings.

DESCRIPTION
The claims are underlain by folded and faulted Helikian sediments of the Dismal Lakes and Hornby Bay Groups which unconformably overlie Aphebian granitic rocks. The granitic rocks underlie the southeast margin of the claims.

Uranium occurs in quartzose sandstones and conglomerates (units 8 and 11, Baragar and Donaldson, 1973).

CURRENT WORK AND RESULTS
A track etch survey suggested extensions of mineralization in the area underlain by Helikian sediments.

YUK	Uranium
Imperial Oil Ltd.,	86 N/7
111, St. Clair Ave. W.,	67°18'N, 116°51'W
Toronto, Ontario M5W 1K3	

REFERENCES
Baragar and Donaldson (1973).

PROPERTY
YUK 1-502

LOCATION
The claims lie between Mountain and Dismal Lakes, about 550 kilometers (340 miles) north of Yellowknife.

HISTORY

In 1972, Imperial Oil Ltd. found radioactive boulders to the north of Aquitaine's PEC claims and in 1973 staked YUK 1-66. Between 1973 and 1975 ground radiometric, EM, magnetic and seismic surveys, an airborne spectrometer survey, a radon soil survey, and diamond drilling were carried out and YUK 67-95 were staked.

DESCRIPTION

The property (Fig. VI-6) is underlain by Helikian quartzose sandstone, conglomerate, dolomite, siltstone, and shale of the Hornby Bay Group; dolomite of the Dismal Lakes Group; intercalated basalt flows and sandstone of the Copper Creek Formation; and Aphebian porphyritic felsite and granites, all cut by the Teshierpi Fault (Baragar and Donaldson, 1973).

CURRENT WORK AND RESULTS

In 1976 geological mapping, lake water and sediment sampling, 3,472.4 meters (1,139.2 feet) of diamond drilling on 23 holes and track-etch, ground radiometric, seismic, gravity and EM surveys tested the YUK group and YUK 96-502 were staked. Pitchblende, secondary uranium minerals and cobalt and nickel minerals were found in quartzose, sandstone and conglomerate of the Hornby Bay Group. The best drill core assay was 4.63% U_3O_8 over 0.30 meters (1 foot) within a section assaying 1.23% U_3O_8 over 1.90 meters (5.75 feet).

BRUCE, MIKE, JEFF, ROD, TIM	Uranium
BP Minerals Ltd.,	86 N/7
Suite 212, 25 Adelaide St. E.,	67°20'N, 116°57'W
Toronto, Ontario M5C 1Y2	

REFERENCES

Baragar and Donaldson (1973)

PROPERTY

BRUCE 1-28; JEFF 1-34; MIKE 1-29; ROD 1-3; TIM 1-15.

LOCATION

The claims are south of Dismal Lakes (3, Fig. VI-6) about 550 kilometers (340 miles) north of Yellowknife.

HISTORY

Aquitaine Co. of Canada Ltd. who found a uranium showing in 1968 staked the PEC claims in 1969.

In 1972 Imperial Oil Ltd. found radioactive boulders to the north of the PEC claims and staked the YUK claims.

In 1974 BP Minerals Ltd. discovered a showing north of the PEC and YUK properties, staked the JEFF, BRUCE, MIKE, ROD and TIM groups and did some geological mapping, geochemical sampling and ground radiometric surveying. In 1975 geological mapping and soil sampling found two additional uranium showings.

DESCRIPTION

The claims are underlain by Helikian quartzose sandstone and minor conglomerate of the Hornby Bay Group (Baragar and Donaldson, 1973). Uranium is found along faults, fractures and bedding planes in the quartzose sandstone.

CURRENT WORK AND RESULTS

Twenty-eight soil samples were analysed for uranium, lead, molybdenum, nickel, copper and cobalt. A track-etch survey did not find significant radon concentrations. Two drill holes, totalling 1,158 feet (353 meters), failed to intersect radioactive material.

HORNBY-DEASE PROJECT	Uranium
Imperial Oil Limited,	86 L/7,8,10,14
111, St. Clair Ave. W.,	66°37'N, 118°52'W
Toronto, Ontario M5W 1K3	

REFERENCES

Baragar and Donaldson (1973); Craig *et al.* (1960); Hornbrook *et al.* (1975).

PROPERTY

H 65-72; H 95-98; H 110-125.

LOCATION

The claim blocks (Fig. VI-7) are 300-325 miles (490-525 km) northwesterly of Yellowknife on the peninsula between Hornby Bay and Dease Arm of Great Bear Lake. The H claims are in three blocks aligned in a northwesterly direction at about 12 mile (17 km) spacing.

HISTORY

All three claim groups were staked in early 1976 to cover lake sediment uranium anomalies delineated by a government survey (Hornbrook *et al.*, 1975).

DESCRIPTION

All three claim groups lie in an area underlain by Hornby Bay Group rocks with a variable amount of glacial drift cover. Claims H95-98 on 86 L/14 near Dease Arm, are in an area of easterly trending drumlinoid ridges, claims H110-125 near Hornby Bay on 86 L/7, 8 lie in a zone of northerly trending drumlins. Claims H 65-72 are completely drift covered and lie near the boundary between the two ice transportation directions, as indicated by drumlin alignment.

Imperial Oil reports that bedrock exposed on the claim group near Dease Arm resembles sandstone of unit 8, as described from 86 N and O (Baragar and Donaldson, 1973) whereas quartzose sandstone that outcrops on or around the other two claim blocks resembles unit 11.

The properties cover rocks with mainly gently dips and variable strikes.

CURRENT WORK AND RESULTS

Lake sediment and lake water sampling checked, confirmed and outlined in more detail anomalies detected in an earlier reconnaissance (Hornbrook *et al.*, 1975). Samples were taken from 27 lakes, on and as far as 4.5 miles (7 km) from claim groups. One lake was sampled in 2 places. At each of the locations a lake water and a lake sediment sample was taken. Analyses were made for uranium in water and for uranium and copper in sediments. Analyses for nickel, zinc and lead were made in some areas.

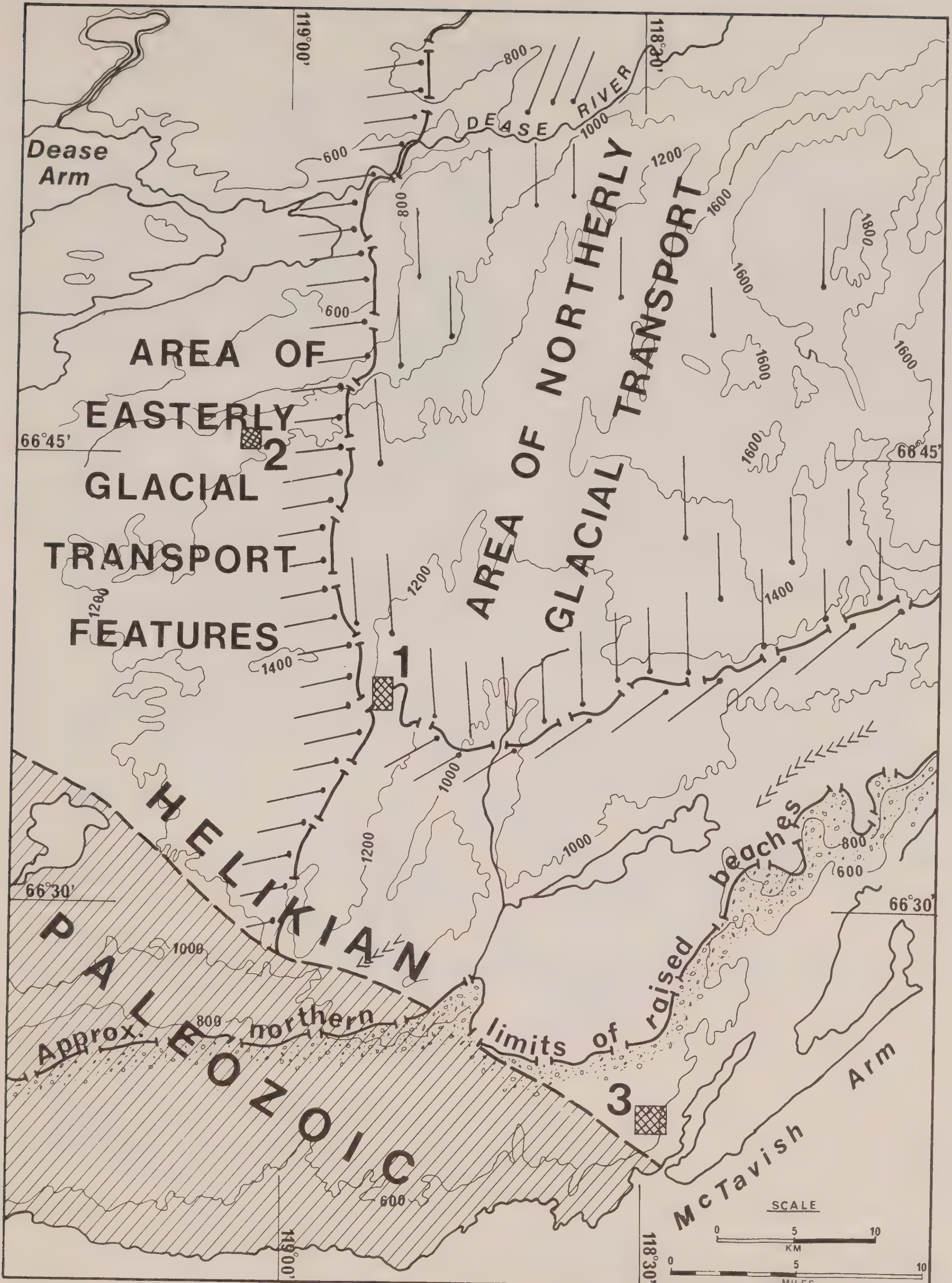


Figure VI-7: Properties, surficial and bedrock geology in Dease Arm - McTavish Arm area
1. H 65-72 claims; 2. H 75-78; 3. H 110-125.

THE SLAVE STRUCTURAL PROVINCE

J.B. Seaton[1] and E.J. Hurdle[2]

D.I.A.N.D., Geology Office, Yellowknife

Introductory sections to the Slave Province and its subdivisions are essentially those in the 1975 Mineral Industry Report, modified with reference to more recent publications.

Somewhat less than two-thirds of the Slave Structural Province is made up of Archean sediments and volcanics or their metamorphosed or granitized equivalents (McGlynn and Henderson, 1970). The supracrustal rocks, mainly of the Archean Yellowknife Supergroup, of which about 15% are volcanics, are exposed in sinuous and anastomosing belts, which are locally wrapped around basement gneisses and commonly flanked, separated, or interrupted by bodies of intrusive quartz-diorite, quartz-monzonite and granite. The supracrustal belts though of locally varying strike, have a general northerly elongation. Relatively narrow volcanic belts containing various proportions of mafic, intermediate and felsic components are commonly flanked on one, or more rarely, on both sides by metasediments. The metasediments are predominantly greywacke, which is commonly interbedded with thinner layers of pelitic composition that tend to have a phyllitic or slaty cleavage. A topographically recessive graphitic phyllite may overly the volcanics or may be found locally within the volcanic sequence.

The granitoid plutons show various intrusive contact relationships with the surrounding supracrustal rocks, ranging from concordant with the strike of the surrounding metasediments to markedly crosscutting. The plutons are locally bordered by migmatite zones, and metamorphic aureoles may be wide or practically absent. Many of the larger plutons are multilobed in outline. Massive posttectonic grandiorites and quartz-monzonites with associated pegmatite, and strongly crosscutting relationships to the wall rocks have been mapped but they appear to be of small volume.

Mineral discoveries have been mainly in volcanic rocks and consequently these rocks have received most of the exploration effort. Much work remains to be done to determine the relations between the supracrustal rocks and the granites.

Extent of pre-Yellowknife Supergroup basement is still largely a matter for speculation and will remain so until more geochronological studies and detailed mapping have been done. Locally plutonic gneisses, commonly of tonalitic composition unconformably underly supracrustal rocks of the Yellowknife Supergroup as at Point Lake (Baragar and McGlynn, 1976; Henderson, 1975; Henderson and Easton, 1977). Commonly the basal contact of the Yellowknife Supergroup has been obliterated by granitic intrusion. Broad zones of granitic gneiss and migmatite and mixed gneisses including or derived from Yellowknife Supergroup rocks (unit An of McGlynn, 1977) may include areas of basement so far unrecognized. Some of the tonalitic clasts in Yellowknife Supergroup sediments may be derived from unroofed syntectonic plutons.

A number of volcanogenic silver-base metal sulphide deposits have been found near exposures of possible pre-Yellowknife Supergroup basement. Since one or more early periods of vulcanism resulted in accumulation of volcanics round the edge of basins filled largely with turbidites, this is not surprising. The basins were presumably flanked by pre-Yellowknife Supergroup basement. Some of the sediments may be time equivalents of and interfinger laterally with the periferal volcanics. Iron formations within the sediments may be distal products of vulcanism. That the volcanics were not continuous across the basins is suggested by the fact that over a wide area centred on Pellatt Lake and extending from approximately latitude 64° to 66° north and from longitude 108° to 113° west intrusive granitic rocks are in contact with metasediments only. If metavolcanics were originally present, one would expect that they would be, at least locally, preserved over this wide area between exposures of metasediments and granitic intrusions or as inliers in the metasedimentary roofs to the plutons.

The last decade has witnessed a progressive widening of target areas for volcanogenic sulphide deposit exploration, within the Slave Province. Early reconnaissance outlined most of the volcanic belts. Later surveys recognized volcanics in a few areas which had been previously mapped as sediments. Exploration spread to nearly all the greenstone belts including areas newly recognized as underlain by volcanics. At present exploration is being extended into high grade metamorphic and migmatitic terrain.

Most, if not all, of the metavolcanics in the Slave Province have been covered by airborne EM and magnetometer surveys; in some cases by more than one. Many miles of formational conductors have been delineated. Possibly the need to screen these anomalies will result in greater detail in future geological surveys.

Exploration projects are described in the order given in Figure VII-1.

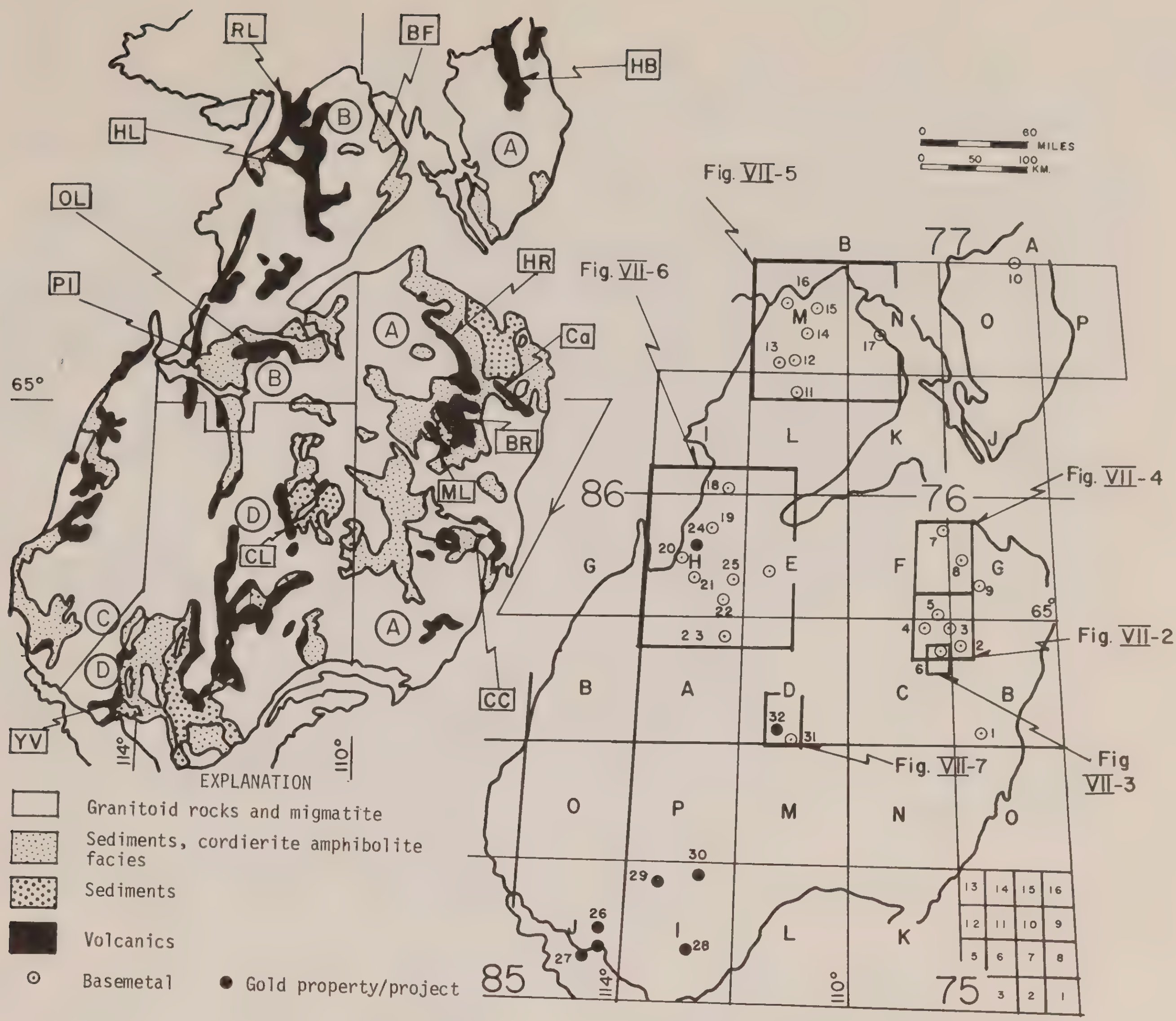
Boundaries between eastern, western, northern and southern Slave Province are those used in the 1975 Mineral Industry Report, except that all properties in the Itchen-Point Lake area (Fig. VIII-1) are included in the northern Slave Province.

Selected references relating to specific parts of the Slave Province or to individual properties are listed in the appropriate subsections. Some general references on the Slave Province and some which, by their nature, do not lend themselves to inclusion in regional subsections (for example, regional geochemical or airborne radiometric surveys by the Geological Survey of Canada) include:

Allan and Cameron (1973); Allan, Cameron and Durham (1973a, b, c); Baragar (1966); Baragar and McGlynn (1976); Darnley (1971); Darnley and Grasty (1972); Henderson (1970, 1975a, 1975b); Lord (1941, 1942, 1951); McGlynn (1977); McGlynn and Henderson (1972); Henderson and Easton (1977); Richardson and Charbonneau (1973).

Some additional general references are given under each subheading to avoid repitition in successive property reports.

[1] District Geologist, Mackenzie Region
[2] Staff Geologist



MAIN DIVISIONS OF THE SLAVE PROVINCE
(used in this report for grouping properties and projects)

A. EASTERN

CC, Clinton Colden Lake Volcanic Belt (1)*; BR, Back River Volcanic Complex (Fig. VII-2)(2, 3, 4, 5); ML, Muskox Lake Volcanic Belt (Fig. VII-3)(6/i, ii); HR, Hackett River (Beechey Lake) Volcanic Belt (Fig. VII-4)(7/i, ii, 8); Ca, Casey Lake Volcanic Belt (9); HB, Hope Bay Volcanic Belt (10).

B. NORTHERN

HL, High Lake Volcanic Belt (11, 12, 13, 14, 15); RL, Run Lake Volcanic Belt (16/i, ii); BF, Bathurst Fault Area (17); PL, Point Lake-Itchen Lake Volcanic Belts and area (18, 19/i, ii, 20, 21/i, ii, 22, 23, 25); OL, Olga Lake Belt.

C. WESTERN

Reconnaissance work but no individual property reports.

D. SOUTHERN

CL, Courageous Lake Belt (31, 32/i, ii); YV, Yellowknife Volcanic Belt (26, 27); NTS-85I, Hearne Lake Map Area (28, 29, 30).

KEY TO PROPERTIES OR PROJECTS IN ORDER OF REPORTING

BASE METALS - CLAIM AND PROPERTY OR PROJECT NAME

(1)* CC, NOR (2) LRG (3/i) ROY (3/ii) PALE (4) BAC (5) GM, SMR (6/i) CABIN, PER (6/ii) OX (7/i) Hackett-Back River Project, (7/ii) Bathurst Norsemines property (8) IM (9) POL (1o) WAN (11) DET, IN (12) Prospecting Permit 315 (13) JAS (14/i) KING, (14/ii) HI (15) PAN (16) RUN, XVM (17) Prospecting Permit 358 (18) BEN, CG, FO, FU, MM, RAL (19/i) BOW (19/ii) HAN (20) CRAB (21/i) FOG, ROC, (21/ii) RETA (21/iii) ROB, ROR, RUT. (22) MARS (23) MARG (25) Prospecting Permit 432. (31) Tundra Project.

GOLD

(24) REN. (26) ROD. (27) YT. (28) DS, TA. (29) RIBB. (30) ALICE. (32/i) TK, (32/ii) Salmita Property

( )* Property/project numbers as in diagram.

Figure VII-1: Location map and grouping system for Slave Province properties and projects

MASSIVE SULPHIDE EXPLORATION

Exploration was concentrated in the northern and eastern parts of the Slave Province.

As in 1975, most massive sulphide exploration in the Mackenzie District was concentrated in the northern and eastern parts of the Slave Province. The number of projects reported decreased by about 40% of the 1975 figure, reflecting a shift from massive sulphide exploration to uranium exploration which is concentrated in the Bear and Churchill Province.

EASTERN SLAVE PROVINCE

Thirteen projects were reported in the Eastern Slave Province and over 75% of this exploration was on the Hackett River Volcanic Belt, on the Back River Volcanic Complex and the nearby Muskox Lake Volcanic Belts (Figs. VIII-1, 2 and 3).

Geological Survey of Canada reports, written on these areas prior to 1973, include those by: Barnes and Lord (1952); Brown (1950a, b); Folinsbee (1949, 1952); Fraser (1964); Tremblay (1971); Wright (1967).

Selected post-1973 reports are referred to in individual project or property reports.

CC AND NOR CLAIMS	Zinc
Kennco Exploration Canada Ltd.,	76 B/4
Suite 730,	64°06'N, 107°40'W
505, Burrard Street,	
Vancouver, B.C.	

REFERENCES
Gibbins *et al.* (1977); Lord and Barnes (1954); Seaton (1978); Wright (1967).

PROPERTY
CC 1-200; 22 NOR claims

LOCATION
The claims cover part of the north shore of Clinton Colden Lake 235 miles (378 km) northeasterly of Yellowknife.

HISTORY
The property was staked for a prospecting syndicate in 1973, then transferred to Windflower Mining Limited, who optioned it to Noranda Exploration Company Limited and later to Kennco Explorations Canada (Seaton, 1978).

DESCRIPTION
The claim groups are underlain by northwesterly trending metavolcanics and metasediments. Massive sphalerite float was found in a boulder field on the east side of a peninsula at the north side of Clinton Colden Lake (Gibbins *et al.*, 1977).

Kennco geologists report the volcanics on the property are predominantly epiclastic andesitic ash and lapilli tuffs interbedded with andesitic flows, and felsic pyroclastics and flows. Small gossans are commonly associated with the felsic rocks.

CURRENT WORK AND RESULTS
Horizontal loop EM surveys explored ten grids (Fig. VII-). Conductors were located on all but one grid. Gravity surveys on four of the grids failed to find anomalies indicative of massive sulphides. Most grids were explored by mapping, soil sampling and magnetometer surveys. Soil samples were analysed for copper, zinc, lead, silver, nickel, manganese and mercury.

Water samples of the lakes and streams did not have any anomalously high copper or zinc concentrations.

LRG CLAIMS	Base metals, Silver
Great Plains Development Co. of Canada Limited,	76 B/12
715-5th Avenue S.W.,	64°43'N, 107°57'W
Calgary, Alberta.	

REFERENCES
Gibbins *et al.* (1977); Lambert (1976, 1977, 1978).

PROPERTY
LRG 1-56

LOCATION
The claims (Fig. VII-2) are 255 miles (410 km) northeasterly of Yellowknife and three miles south of the Back River.

HISTORY
Great Plains staked the claims in 1975 in a joint venture with Riocanex, who hold a 50% interest in the property.

The claims were mapped in 1975, and some soil and rock samples of gossan zones were taken.

DESCRIPTION
LRG 1-56 cover a southward extending tongue of the Back River Volcanic Complex. The southern part of the claims are underlain by rhyolite in fault contact to the north with intermediate volcanics (Lambert 1978).

Larger scale mapping by Great Plains shows both intermediate and felsic volcanics south of the fault and also suggests that the volcanics form a southward plunging anticline flanked by metasediments, which underlies most of the property (Gibbins *et al.*, 1977).

CURRENT WORK AND RESULTS
Copper, lead and zinc contents of soil samples from gossans capping metasediments along the southeast margin of the metavolcanics were low. Rock and soil sampling of gossans over intermediate volcanics in the northwest of the claims gave similar low values.

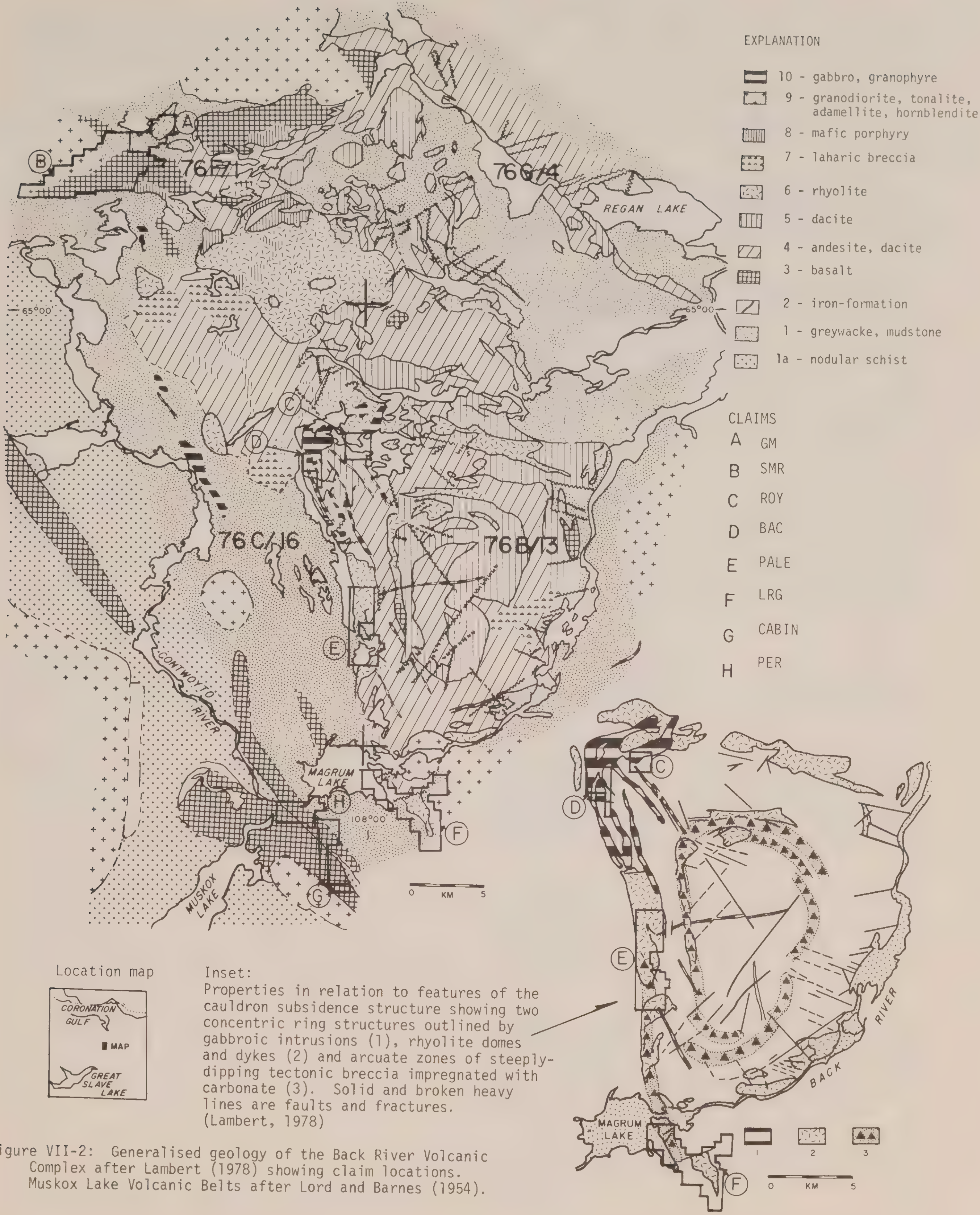
Three conductors were found by horizontal loop EM which covered the southeastern margin of the volcanics.

ROY CLAIMS	Copper, Zinc
Cominco Ltd.,	76 B/13, 76 C/16
200, Granville Square,	64°55'N, 108°10'W
Vancouver, B.C.	

REFERENCES
Lambert (1976, 1977, 1978); Seaton (1978).

PROPERTY
ROY 1-20

LOCATION
The claims (Fig. VII-2) are 10 miles (1.6 km)



Inset:
Properties in relation to features of the cauldron subsidence structure showing two concentric ring structures outlined by gabbroic intrusions (1), rhyolite domes and dykes (2) and arcuate zones of steeply-dipping tectonic breccia impregnated with carbonate (3). Solid and broken heavy lines are faults and fractures.
(Lambert, 1978)

Figure VII-2: Generalised geology of the Back River Volcanic Complex after Lambert (1978) showing claim locations. Muskox Lake Volcanic Belts after Lord and Barnes (1954).

east of the junction of the Tarpon and Contwoyto Rivers 255 miles (425 km) northeasterly of Yellowknife.

HISTORY

The ROY claims were staked in 1974. In 1975 the claims were mapped and 16 rock samples were assayed for lead, zinc, copper and silver.

DESCRIPTION

ROY 1-20, which lie in the central part of the Back River volcanic complex, are underlain mainly by felsic to intermediate volcanics and gabbroic intrusives (Seaton, 1978). The volcanics contain minor amounts of chalcopyrite and sphalerite.

CURRENT WORK AND RESULTS

Geophysical surveys covered a 600 by 400 meter grid in the central part of the claim block.

Vertical and horizontal loop EM surveys found only one conductor of the two originally located in 1969. A magnetic survey outlined a magnetic high along a gabbro-volcanic contact, but found no magnetic expression over the conductor. A gravity survey was also done.

PALE CLAIMS	Pb, Zn, Ag
Cominco Ltd.,	76 B/13, 76 C/16
200, Granville Square,	63°49'N, 108°00'W
Vancouver, B.C. V6C 2R2	

REFERENCES

Lambert (1977, 1978).

PROPERTY

PALE 1-53

LOCATION

PALE 1-53 (Fig. VII-2) are about eight miles (13 km) north-northeasterly from the confluence of the Back and Contwoyto Rivers, and northwest of the Heywood Range.

HISTORY

The PALE claims were staked in 1975 and 1976 after an argentiferous lead and zinc sulphide showing was found while ground checking an area covered by an airborne EM survey done several years earlier. The showing does not however coincide with any AEM conductor. This sulphide occurrence was trenched in 1975.

DESCRIPTION

Most of the 53-claim PALE group is underlain by intermediate and felsic volcanics. Scattered throughout the claims are exposures of rhyolite provisionally mapped as intrusives by Cominco geologists but interpreted by Lambert (1977) as a complex of flows and exogenous domes.

A grid covering seven claims in the central part of the property and including the Pale silver-base metal showing is underlain by andesite and dacite flows and by dacite fragmentals and intrusives. Iron formation, metamorphosed to garnet amphibolite, contains concentrations of iron oxides, carbonates and pyritic chert and strikes northwest through the western part of the Pale grid.

The Pale silver-base metal showing is in silicified and hematised dacite.

CURRENT WORK AND RESULTS

EM surveys over the 1,000 x 600 meter Pale grid failed to detect any conductors indicative of base metal sulphides. Turam EM and magnetic surveys outlined the iron formation.

A horizontal loop EM survey on a 300 x 300 meter grid, 1,000 meters south of the Pale grid, also failed to detect significant conductors.

An IP survey of the Pale grid showed that strong chargeability characterizes the main sulphide showing, with weaker responses about 50 meters to the northwest and 100 meters to the southeast along the projected strike of the mineral zone. The showing coincides with a gravity anomaly of only 0.1 milligal.

Three hundred and sixteen soil samples collected mainly from PALE 1-3 where boulders containing lead-zinc had been found, outlined several geochemical anomalies, some coincident with previously found mineralization.

BAC CLAIMS	Copper, Zinc
Cominco Ltd.,	76 C/16
200, Granville Square,	64°55'N, 108°04'W
Vancouver, B.C., V6C 2R2	

REFERENCES

Lambert (1976, 1977, 1978)

PROPERTY

BAC 1-11

LOCATION

The claims (Fig. VII-2) are about 260 miles (420 km) northeasterly of Yellowknife and about 16 miles (26 km) north-northeasterly of Muskox Lake.

HISTORY

A square block of claims, BAC 1-9, were staked in 1975. BAC 10, 11 were added at the southeast corner of the block in 1976.

DESCRIPTION

The property is in the western part of the Back River volcanic complex in a zone where northerly striking dacitic and andesitic volcanics are intruded by gabbro (Lambert, 1978). Cominco geologists report the claims are underlain by a volcanic sequence with minor iron formation and argillite.

A small copper-zinc showing is situated in the central part of the claim group.

CURRENT WORK AND RESULTS

Geophysical surveys covered an area 400 by 200 meters in the central part of the property. A horizontal loop EM survey found conductors to correspond with graphitic argillite. There was no EM response over the copper-zinc showing.

Magnetic and gravity surveys did not give results indicative of massive sulphides.

GM AND SMR CLAIMS
Brascan Resources Ltd.,
Suite 502,
1155, West Pender Street,
Vancouver, B.C.

Base metals, silver
76 F/1
65°07'N, 108°20'W

REFERENCES
Frith and Hill (1975); Frith *et al.* (1977); Lambert (1976, 1977, 1978).

PROPERTY
22 GM claims, 99 SMR claims

LOCATION
The GM and SMR claims are about 240 miles (385 km) northeasterly of Yellowknife, and 25 miles (40 km) west of Regan Lake.

HISTORY
The claims, registered in the name of Brascan Resources were staked in 1975 on behalf of the Yava Syndicate to cover a gossan found by airborne reconnaissance.

The GM and SMR claims were explored by a preliminary geological and geochemical survey in 1975.

DESCRIPTION
A westerly trending apophysis of the Back River volcanic complex extends some 6 miles (10 km) through the claims, and is in contact with metasediments in the northern and southern parts of the property. A granodiorite and diorite pluton intrudes both metavolcanics and metasediments in the western half of the claim block.

CURRENT WORK AND RESULTS
Geological mapping of the claims by Brascan Resources show them to be predominantly underlain by locally pillowed and carbonitized andesites (Fig. VII-2) which outcrop in the south of the claims where they overly metasediments. Rhyolite and dacite tuffs and agglomerate possibly related to a rhyolite dome, which underlies the northern part of the property, are separated from the andesites by a thin sequence comprising slate, greywacke, quartzite and minor iron formation. The volcanic stratigraphy is uncertain because of the lack of top indicators.

Water, rock and soil samples from parts of the area underlain by rhyolite and dacite tuff has anomalous zinc and copper contents. In the northern part of the claims a few rock and soil samples had an anomalous lead content and soils from gossan zones capping iron formation contained high copper concentrations.

CABIN AND PER CLAIMS
Great Plains Development Company of Canada Limited,
715-5th Avenue S.W.,
Calgary, Alberta.

Copper, zinc, silver
76 C/9
64°41'N, 108°04'W

REFERENCES
Barnes and Lord (1952); Gibbins *et al.* (1977).

PROPERTY
24 CABIN claims; PER 1-29.

LOCATION
The claims (Fig. VII-3) are about 250 miles (405 km) northeasterly of Yellowknife at the confluence of the Back and Contwoyto Rivers.

HISTORY
Great Plains in a joint venture with Riocanex staked the PER claims in 1974 to cover a copper showing and gossans. Soil sampling explored the gossans. Trenching tested the 'Main gossan' (Fig. VII-2) and failed to reach bedrock at the copper showing where boulders at surface contain as much as 4.5% copper and 1.12 oz/ton silver.

The Main Gossan extension west of the Back River was tested by Central Arctic Copper Limited in 1970. Nine short holes were drilled and the best intersection was about 1% copper across five feet with minor zinc and silver values.

DESCRIPTION
The geology of the claim groups is shown in Fig. VII-3. The 'Main Gossan' has developed over pyrite and locally minor chalcopyrite in a sequence of intermediate to felsic volcanics and black shales marginal to a thicker mafic sequence.

CURRENT WORK AND RESULTS
The CABIN claims were mapped and soil samples collected over and adjacent to the Main Gossan were analysed for copper, lead and zinc. No anomalies were found.

Horizontal loop EM tested a single line in the northwest corner of the CABIN claims using 200 and 400 foot coil separations. The latter separation detected a broad moderately strong conductor coincident with the Main Gossan at the volcanics-sediment contact (Fig. VII-3). On the PER claims the area surrounding the copper showing was tested by soil sampling and horizontal loop EM surveys. No geochemical anomalies or conductors were detected.

OX CLAIMS
Landsat Joint Venture,
c/o Trigg, Woollett & Associates Ltd.,
10504 - 103rd Street,
Edmonton Alberta.

Copper, Zinc
76 C/9
64°36'N, 108°12'W

REFERENCES
Lord and Barnes (1954)

PROPERTY
OX 1-10

LOCATION
The claims (Fig. VII-3) are at Muskox Lake, 240 miles (385 km) northeasterly from Yellowknife.

HISTORY
OX 1-10 were staked in 1976.

DESCRIPTION
The OX claims are underlain by easterly striking metavolcanics and metasediments which dip steeply to the south. Mafic and overlying felsic metavolcanics that outcrop in the northern part of the claim group are overlain by metasediments which outcrop in the south.

Graphitic argillite containing pyrite and pyrrhotite near the contact between the volcanic and sedimentary rocks locally contains chalcopyrite and sphalerite.

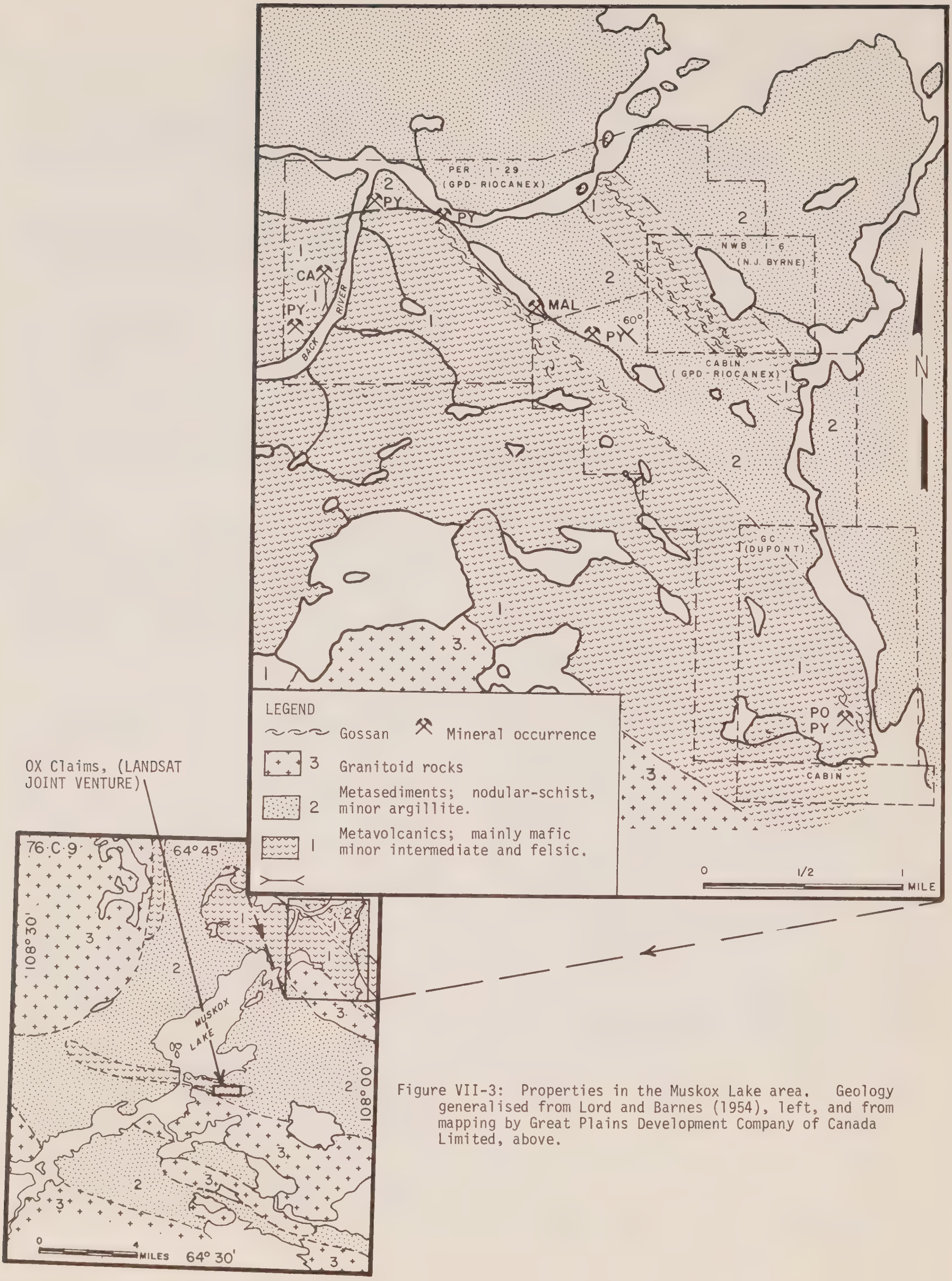


Figure VII-3: Properties in the Muskox Lake area. Geology generalised from Lord and Barnes (1954), left, and from mapping by Great Plains Development Company of Canada Limited, above.

CURRENT WORK AND RESULTS

Mapping at one inch to 100 feet, VLF EM and magnetometer surveys outlined a good conductor coincident with a magnetic high whose axis, for most of its length, lies about 50 feet south of the metavolcanics-metasediments contact.

A soil sampling survey failed to find any correlation with the values obtained and known mineral showings or geophysical anomalies. Soil samples were analysed for copper, lead and zinc. Selected samples of massive pyrrhotite-pyrite contained as much as 1% zinc.

HACKETT-BACK RIVER PROJECT
Cominco Limited,
200, Granville Square,
Vancouver, B.C., V6C 2R2

Copper, lead, zinc
76 F/9, 76 G/12
65°41'N, 108°04'W

REFERENCES

Bryan (1978); Gibbins *et al*. (1977); Frith and Hill (1975); Frith *et al*. (1977); Seaton (1978).

PROPERTY

The claims discussed under this project are shown in Figure VII-4.

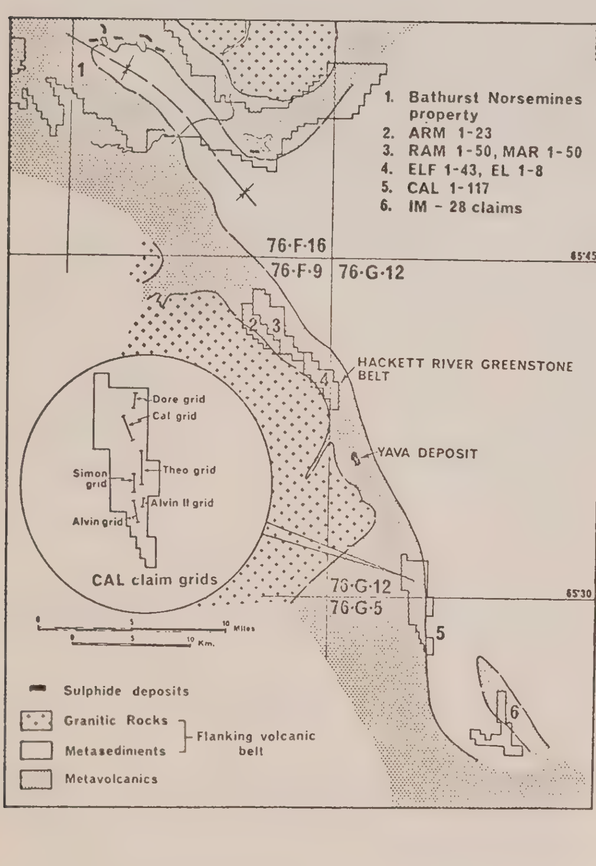


Figure VII-4: Location of properties in the Hackett River Belt.

LOCATION

The claims included in the Hackett-Back River Project are about 295 miles (495 km) northeasterly of Yellowknife and extend about 20 miles (32 km) northwesterly along the Hackett River (Beechey Lake) volcanic belt. The Yava massive sulphide deposit is about half way between the CAL and ELF-EL group.

HISTORY

The ELF claims were staked for Cominco Limited in 1974. The CAL claims in which Cominco now has a 90% interest were optioned from Precambrian Mining Services Limited. The remaining claims were staked in 1975 following airborne EM and magnetometer surveys. Ground testing of anomalies included mapping and geochemical surveys.

DESCRIPTION

The ARM, EL, ELF, MAR and RAM claims are mainly underlain by intermediate and felsic volcanics (Gibbins *et al*., 1977). A galena-sphalerite-chalcopyrite showing is associated with a pyrite gossan which has developed over a rhyolite fragmental unit that outcrops in the central part of the claim block.

The CAL claims are mainly underlain by intermediate and felsic volcanics, a unit of which contains massive to disseminated pyrite. The eastern boundary of the property is underlain by greywacke and schist.

CURRENT WORK AND RESULTS

Geophysical surveys covered areas chosen as a result of geological mapping and airborne geophysical survey (Gibbins *et al*., 1977).

Five grids were laid out on the ELF claims; the Main Grid at approximately 65°41'N, 108°04'W and the ELF Numbers 1, 2 and 3 grids which together cover an area of about one square mile centred at 65°40'N, 108°02'W. The Number 4 Grid is at about 65°39'N, 108°01'W.

A gravity survey over the Main Grid showed residual gravity contours to be related to a mafic intrusive flanked by rhyolite. The northwesterly striking intrusive, which is probably a dyke has no magnetic expression.

Most of the EM conductors on ELF Numbers 1, 2 and 3 grids had magnetic expression and were associated with gossans. No conductors were detected on the ELF Number 4 grid where the high magnetic readings may be related to pyrrhotite in volcanics.

A gravity survey on the RAM claims, over a grid centred at about 65°42'N, 108°06'W failed to detect any anomalies over the gossans. The results reflect a sequence of alternating felsic and mafic volcanics and crosscutting diabase dykes.

The locations of the six grids covering AEM conductors on the CAL claims are shown in Figure VII-4.

Ground EM surveys on the Calhoun grid found two conductors; one roughly coincident with an AEM anomaly of the eastern extremity of the grid and described by Cominco as a 'probable conductor'; the other at the south end coincident with the southern portion of a longer AEM anomaly. A gravity survey which partially covered the grid found a weak residual anomaly 100 to 150 feet east of the second conductor.

One conductor with coincident magnetics for part of its length was outlined on the Simon Grid.

One narrow conductor with strong magnetic coincidence was detected on the Theo Grid. This grid covers AEM conductors within volcanics just west of their contact with metasediments.

The Alvin Grid lies entirely within a large overburden covered river valley. The Alvin II grid extends the Alvin Grid to cover a small gossan. A gravity survey over the Alvin Grids only reflected the topography and showed no relationship to the conductors.

The six EM conductors found on the grids have magnetic coincidence where surveyed and correspond to two more extensive AEM anomalies.

BATHURST NORSEMINES PROPERTY — Silver, Zinc
BB CLAIMS — Copper, Lead
Cominco Limited, — 76 F/16
200, Granville Square, — 65°55'N, 108°22'W
Vancouver, B.C., V6C 2R2

REFERENCES
Franklin (1976); Jefferson *et al.* (1976).

PROPERTY
The Bathurst Norsemines Option consists of 1101 AC, BAT, BB, DC, H, HURST, J, JAR, JO, K, L, LC, LD, M, MAY, ND, OKT, ONO, OX, RN and SK claims.

LOCATION
The claims extend east and west of a major bend in the Hackett River about 300 miles northeasterly of Yellowknife (Figs. VII-1, VII-4).

HISTORY
Most of the claims were staked in 1970 and 1971. By the end of 1975, 29 H, 57 J, 6 JAR, 9 MAY and 43 LC claims had lapsed.

DESCRIPTION
The silver-base metal deposits of the Bathurst Norsemines Property occur near the top of a sequence of intermediate to felsic volcanics which overlie metasediments of the Hackett River gneiss dome. The sulphide deposits are in a band of cherty tuffite, chert and cherty rhyolite. There are calc-silicate outcrops near the sulphides. The calc-silicate is mainly coarse grained diopside. Mill rock, which may be of laharic origin (Franklin, 1976), is abundant in the footwall of the sulphide bodies. Sillimanite porphyroblasts are abundant in a unit mapped by Cominco geologists as sillimanite tuffite. Spectacular pink garnets, some over half an inch in diameter are abundant in the alteration pipe beneath the A-zone sulphide deposit on the north side of Camp Lake. Silicification and sericitisation locally give rise to a lacy chicken wire texture in the alteration pipe. Anthophyllite and cordierite are also abundant within the alteration zone; the cordierite giving rise to spotted rock. Massive to disseminated pyrite, pyrrhotite, sphalerite, chalcopyrite and galena, locally with granite constitute the mineralization.

CURRENT WORK AND RESULTS
Relogging of drill cores was continued and detailed. Geological surveys filled gaps in map coverage. A preliminary economic study for Bathurst Norsemines Limited by Wright Engineers Limited gave reserves of 21,490,000 tons in six zones having an overall average grade of 0.013 oz/ton Au, 4.37 oz/ton Ag, 0.75% Pb and 4.98% Zn.

IM CLAIMS — Gold, silver, base metals
Brascan Resources Limited, — 76 G/5
Suite 502, — 65°25'N, 107°40'W
1155, West Pender Street,
Vancouver, B.C.

REFERENCES
Frith and Hill (1975); Frith *et al.* (1977); Seaton (1978).

PROPERTY
IM 1-38

LOCATION
The claims (Fig. VII-4) lie 285 miles (460 km) northeasterly of Yellowknife and 18 miles (29 km) southeasterly of the Yava deposit.

HISTORY
The IM claims were staked in 1974 for the Yava Syndicate in which Brascan Resources, Conwest Exploration Company Limited and S. Roscoe were partners. In 1975 the northern part of the property was mapped. Lake water and frostboils were sampled.

DESCRIPTION
The property which lies just east of the northwest trending Hackett River volcanic belt is mainly underlain by metasediments. Mafic and felsic pyroclastics, part of a thin belt which parallels the Hackett River belt, underlie a northern arm of the claim block.

CURRENT WORK AND RESULTS
The claims were mapped. Samples taken from a trench dug in sulphide iron formation in the southern part of the claims gave high gold and silver assays. Soil sampling of a gossan zone in the northern part of the claims found local concentrations of copper, silver and gold.

POL CLAIMS — Base metals
Cominco Limited, — 76 G/6
200, Granville Square, — 65°18'N, 107°18'W
Vancouver, B.C., V6C 2R2

REFERENCES
Frith and Hill (1975); Frith *et al.* (1977); Seaton *et al.* (1978).

PROPERTY
POL 1-14

LOCATION
The property (Fig. VII-1) is about 300 miles (485 km) northeasterly of Yellowknife and two miles (3 km) east of the Back River.

HISTORY
Cominco staked and partly mapped the POL claims in 1975.

DESCRIPTION
The POL claims are underlain by greywacke, bedded carbonate and shale which dip vertically or steeply northeasterly.

Gossans developed over pyrite bearing graphitic shale and carbonate locally have anomalous copper, lead and zinc contents.

CURRENT WORK AND RESULTS

Mapping at a scale of one inch to one mile, which started in 1975 was completed in 1976.

WAN CLAIMS
Perry River Nickel Mines Ltd.,
217, 513-8th Avenue S.W.,
Calgary, Alberta.

Gold, Silver
76 0/16, 77 A/3
68°00'N, 106°28'W

REFERENCES

Fraser (1964)

PROPERTY

WAN 1-24

LOCATION

The WAN claims (Fig. VII-1) are about 450 miles (720 km) northeast of Yellowknife and 90 miles (145 km) southeast of Cambridge Bay.

HISTORY

The first WAN claims were staked in 1967 to cover a gold discovery. Following sampling and mapping by the Hope Bay Syndicate the claims lapsed but the showings were restaked as WAN 1-24 in early 1973 by Golden Ram Resources Limited and Perry River Nickel Mines acquired a 50% interest in the property. Annual cash deposits maintained the claims in good standing until 1976.

DESCRIPTION

The claims lie toward the eastern side of the Hope Bay greenstone belt. Granitic rocks, quartz-diorite, migmatite, amphibolite and mafic, locally pillowed volcanics underlie the property. The intrusive granitic rocks, which underlie the eastern part of the WAN group are flanked by a migmatitic contact zone, locally as much as 500 feet (150 m) wide, that trends northerly through the centre of the claims. A few pillow observations denote east facing flows. Diabase dykes and shear zones strike northeasterly. The shear zones containing quartz lenses (veins) are locally auriferous.

CURRENT WORK AND RESULTS

The claims were mapped at one inch to 1,000 feet and detailed mapping and a magnetometer survey covered an area containing 9 auriferous shear zones in the central part of the property.

Eight of the ten veins sampled were trenched. Most samples were assayed for gold and silver; the remainder for gold only.

Quartz lenses were found to be auriferous only where they cut the migmatite or granitic rocks near the contact zone. The auriferous zones, a few tens of feet in length are all under two feet wide and contain less than 1 oz/ton Au. One vein carries 7.1 oz/ton Ag over a strike length of 60 feet, but sampling of other veins showed much lower silver contents. The better gold and silver values are associated with minor pyrite, sphalerite, chalcopyrite and galena.

NORTHERN SLAVE PROVINCE

Figures VII-1, VII-5 and VII-6 show the grouping of the 21 projects conducted in the Northern Slave Province. Ten of these were in the Itchen Lake-Point Lake area (Fig. VII-6) where Texasgulf Inc. drilled and intensively explored at and around the Izok Lake sulphide deposit.

Cominco Limited, Noranda Exploration Company Limited, and Texasgulf Inc. staked numerous claims in the arcuate Olga Lake Volcanic Belt (Fig. VII-1) and Texasgulf reconnoitered around Canoe Lake on 76 M/2.

DET AND IN CLAIMS
Cominco Limited,
200, Granville Square,
Vancouver, B.C., V6C 2R2

Base metals
76 L/15
66°50'N, 110°40'W

REFERENCES

Fraser (1964)

PROPERTY

36 DET claims, 11 IN claims.

LOCATION

The IN, DET property (Fig. VII-5) is just south of the Hood River about 320 miles (515 km) north-northeasterly from Yellowknife.

HISTORY

The IN and DET claims were staked in 1974.

DESCRIPTION

The IN, DET claims are underlain by intermediate to felsic volcanics, intruded by diorite. They lie on the eastern side of the main High Lake volcanic belt, a branch of which extends easterly along the Hood River. A narrow northeasterly striking gossan has developed over cherty beds associated with the felsic volcanics.

CURRENT WORK AND RESULTS

Several conductors were found by horizontal loop EM and magnetic surveys which covered a grid in the central part of the IN, DET group.

The conductive zones converge to the southwest and have no magnetic coincidence except at the north and south ends of the grid.

A gravity survey, on two lines showed no clear anomalies associated with the conductors.

PROSPECTING PERMIT 315
Great Plains Development
Company of Canada Ltd.,
715, 5th Avenue S.W.,
Calgary, Alberta.

Copper, Lead, Zinc
76 M/2
67°07'N, 110°45'W

REFERENCES

Fraser (1964); Johnson (1974); Padgham *et al.* (1974); Seaton (1978).

PROPERTY

Prospecting Permit 315

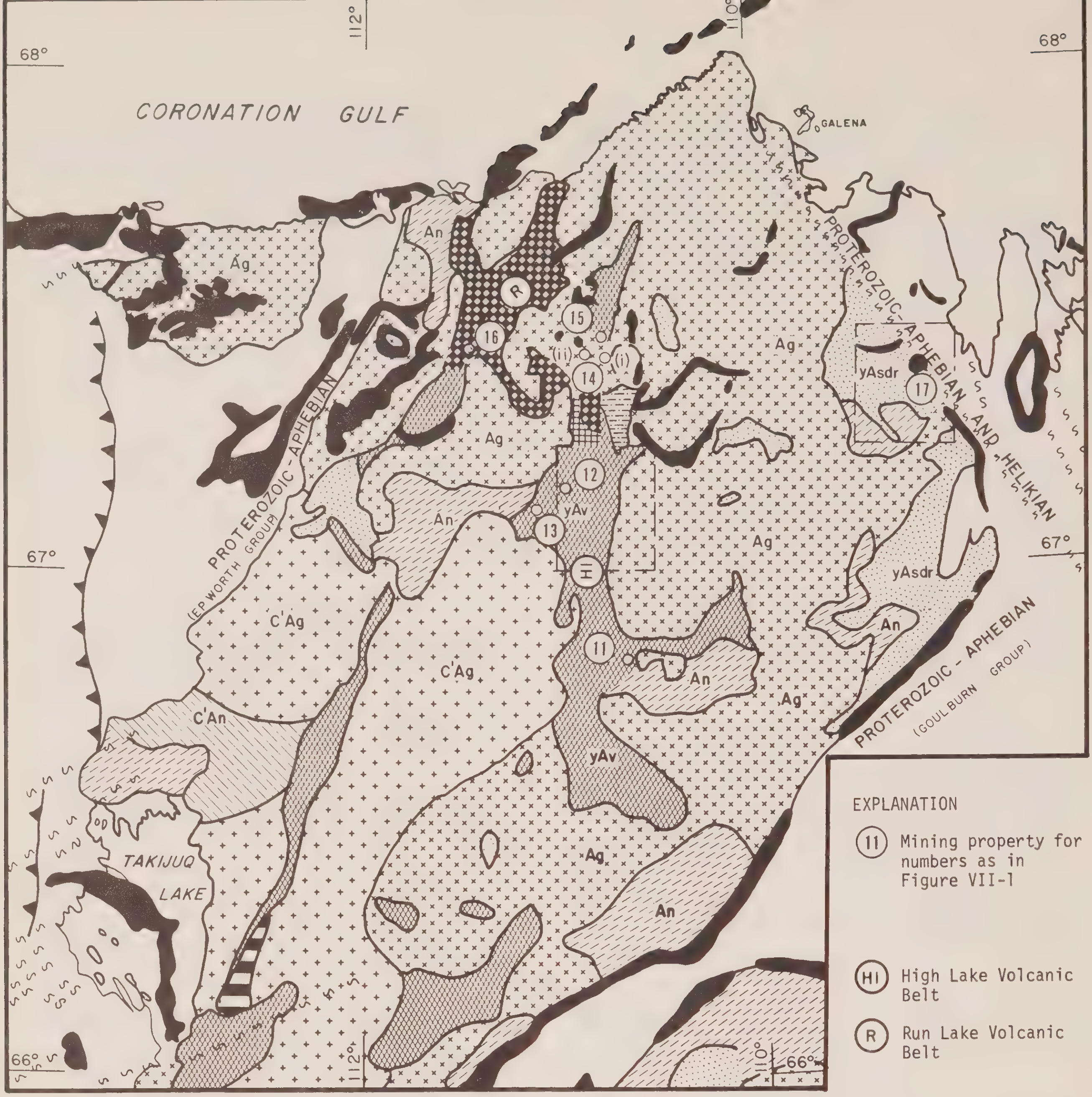
LOCATION

The permit (Fig. VII-5) straddles the James River 45 miles (70 km) south of Grays Bay.

HISTORY

Various companies have explored this area since Kennarctic Explorations Ltd. discovered the High Lake deposit in 1955 (Seaton, 1978).

In 1974 Great Plains Development Company of Canada Limited and Rio Tinto Canadian Exploration Limited, acquired Prospecting Permit 315. It had been mapped at one inch to half mile scale by 1975.



Quartz diorite, granodiorite, quartz monzonite and granite. In part porphyritic. Granitic rocks undivided.

An — Granitic gneiss and migmatite and mixed gneisses involving Yellowknife Supergroup rocks.

Ab — Gabbro, anorthosite, diorite and minor ultramafic rocks

YELLOWKNIFE SUPERGROUP

yAwp — Greywacke, mudstone, turbidites. Includes minor quartzite, conglomerate, limestone and tuff.

yAva — Acidic lava, tuff, agglomerate and ash flow tuff with minor undifferentiated basic volcanic rocks.

yAvd — Basic to intermediate lava, tuff, agglomerate with minor undifferentiated acidic volcanic rocks.

yAv — Volcanic rocks, undivided.

C'An | C'Ag — Migmatite, granitic gneisses or granitic rocks that may be in part older than Yellowknife Supergroup.

yAsdr — Cordierite-andalusite-bearing knotted schists and other metamorphic equivalents of Yellowknife Supergroup sedimentary rocks.

Figure VII-5: Northern Slave Province showing location of properties. Geology from McGlynn (1977).

In 1975 an airborne EM and magnetic survey was followed by surface examination of 25 selected AEM conductors. One conductor was attributed to massive iron sulphides with minor chalcopyrite and sphalerite; the remaining 24 to iron sulphides or to graphite.

Prospecting in 1975 found minor sphalterite, galena and tetrahedrite in pyrite and pyrrhotite bearing veins and fracture zones detected by the airborne surveys.

DESCRIPTION
The permit is underlain by volcanics and metasediments of the northerly trending High Lake supracrustal belt. Rock types of the volcanic sequence (Fig. VII-5) include pillowed basalts, mafic tuffs, andesite and dacite tuffs, flows, breccias, thin intercalated graphitic shales and felsic lavas, tuffs, coarse agglomerates and breccias. Metasediments include greywacke and graphitic slate. The graphitic and pyritic slate grades locally into oxide and sulphide facies iron formation.

CURRENT WORK AND RESULTS
Detailed mapping and prospecting covered an area southeast of Ced Lake in the northwestern corner of the permit, where there are chalcopyrite and sphalerite showings. One of these showings is associated with an AEM conductor. Mapping was followed by a ground EM survey and trenching of selected gossans.

At Marge Lake, on the western margin of the permit 315, soil and rock sampling tested an area of geochemically anomalous drainage, located in a 1975 regional survey by the Geological Survey of Canada. Concentrations of copper, lead and zinc were generally low, in both rock and soil samples.

JAS CLAIMS
Great Plains Development Company of Canada Ltd.,
715 - 5th Avenue S.W.,
Calgary, Alberta, T2P 2X7

76 M/3
67°07'N, 111°02'W

REFERENCES
Fraser (1964)

PROPERTY
JAS 1-40

LOCATION
The JAS claims (Fig. VII-5) are 335 miles (540 km) north-northeasterly of Yellowknife and three miles south of the James River.

HISTORY
JAS 1-40 were staked early in 1975 to cover gossans, noted in reconnaissance mapping in 1974. In 1975 an airborne EM and magnetic survey covered most of Great Plains' Prospecting Permit 315, on 76 M/2 and the MS, LJ, JA and JAS groups, which adjoin the permit. Rio Tinto Canadian Exploration Limited has a 50% interest in the claims.

Ground horizontal loop EM surveys tested conductors located by the airborne EM survey. The geology of the JAS claims was mapped and gossans sampled.

Anomalies described in a lake water sampling survey by the Geological Survey of Canada, in the Great Plains-Riocanex joint venture area were explored.

DESCRIPTION
Intermediate volcanics of the High Lake volcanic belt underly over half of the claim group, and outcrop in the northern and western parts of the property. The east central part of the claim group is underlain by metasediments, mainly black graphitic and in places pyritic shales and slates, which are locally separated from the intermediate volcanics by an iron formation. This iron formation is capped by a gossan and up to 300 feet wide and contains varying proportions of magnetite and pyrite in a black argillaceous matrix. A 300 gamma aeromagnetic anomaly coincides with the iron formation outcrop. Mafic volcanics, mainly pillowed flows underly the southeastern part of the claims.

The claims are in an area of structural complexity where much faulting has occurred.

CURRENT WORK AND RESULTS
A few rock samples and 48 soil samples were collected to trace the source of a geochemical anomaly detected by the Geological Survey of Canada in 1975. Copper lead and zinc values for these samples were only weakly anomalous.

KING CLAIMS
Cominco Limited,
200, Granville Square,
Vancouver, B.C., V6C 2R2

Base metals
76 M/7
65°28'N, 110°50'W

REFERENCES
Fraser (1964); Padgham *et al.* (1974); Seaton (1978).

PROPERTY
KING 1-23

LOCATION
The claims (Fig. VII-5) are 370 miles (595 km) north-northeasterly of Yellowknife and four miles north of the High Lake sulphide deposit.

HISTORY
The KING claims were staked in 1974. In 1975 much of the property was mapped and gossan zones were surveyed by EM, magnetometer and soil sampling.

DESCRIPTION
The KING claims lie in the High Lake supracrustal belt, and are underlain mainly by andesitic tuffs and flows, sericitic felsic tuffs and granitic rocks which intrude the volcanics and volcanoclastics. These northerly striking, steeply to vertically dipping supracrustal rocks are cut by northerly, northwesterly and northeasterly striking diabase dykes.

CURRENT WORK AND RESULTS
An airborne EM and magnetic survey covered the claims. Horizontal loop EM, magnetometer and gravity surveys explored two grids. Some conductors were attributed to lake sediment and others to graphite.

HI CLAIMS
Noranda Exploration Co. Ltd.,
P.O. Box 1619,
Yellowknife, N.W.T.

Copper, zinc
76 M/7
67°28'N, 110°56'W

REFERENCES
Fraser (1964); Padgham *et al.* (1974).

PROPERTY
HI 1-55

LOCATION
The HI claims (Fig. VII-5) lie within the High Lake supracrustal belt 350 miles (565 km) north-northeasterly of Yellowknife and five miles north of the Kennarctic Exploration Limited's High Lake sulphide deposit.

HISTORY
HI 1-55 were staked late in 1974, to cover a gossan, thought to be the cause of an anomalous sediment sample from 980 Lake, which lies in the central part of the claim block.

DESCRIPTION
Northerly striking intermediate and felsic volcanics intruded by granodiorite, diorite and later diabase, underlie the HI claims.

The gently northwesterly dipping diabase which outcrops in the northwest part of the property forms a discordant sheet 200 or more feet (60 m) thick.

Rubble on the west side of a gossan zone exposed on the northeast shore of 980 Lake consists of rhyolite with disseminated chalcopyrite. On the east side, a foot wide band of massive sphalerite outcrops over a strike length of 75 feet. Further north on strike from this zinc showing more sphalerite is exposed near the diabase-volcanic contact.

Noranda geologists interpret mineral zoning in the gossan as indicating stratigraphic tops to the east.

CURRENT WORK AND RESULTS
The HI claims were covered by an airborne EM and magnetic survey which detected conductors coincident with the gossan near 980 Lake. The gossan was mapped, prospected and tested by soil sampling. Soil analyses gave high values for copper, lead, zinc and silver.

Vertical and horizontal loop EM, and magnetometer surveys found a weakly magnetic conductor which corresponds to the gossan and its projection under the more strongly magnetic diabase sheet.

A total of 705 feet of diamond drilling, in two holes tested the conductor and intersected an easterly dipping lens of pyrite and pyrrhotite with minor chalcopyrite and sphalerite. One hole was collared in granodiorite and the other about 400 feet farther north in diabase.

PAN CLAIMS	Zinc
Texasgulf Inc.,	76 M/7, 10
Box 175,	68°30'N, 110°50'W
5000 Commerce Court West,	
Toronto, Ontario, M5L 1E7	

REFERENCES
Fraser (1964); Padgham *et al.* (1974).

PROPERTY
30 PAN claims

LOCATION
The PAN claims (Fig. VII-5) are 365 miles (590 km) north-northeasterly of Yellowknife and five miles (8 km) north of the James River.

HISTORY
The 30 PAN claims were staked in 1974.

DESCRIPTION
The property is underlain by the northern end of the High Lake supracrustal belt. About half the claim block is covered by a small lake.

CURRENT WORK AND RESULTS
Three holes were drilled from lake ice for a total of 1,045 feet (m). One 275 foot hole on PAN 20 failed to reach bedrock and was abandoned. One of the other holes intersected alternating andesite and rhyolite; the other, a succession of andesites, rhyolites and felsic tuffs. The rhyolite and felsic tuffs contained several five and ten foot sections of about 1% Zn and one four foot section of 2.3% Zn.

RUN AND XVM CLAIMS	Copper, Silver
Cominco Limited,	76 M/11
200, Granville Square,	67°36'N, 111°11'W
Vancouver, B.C., V6C 2R2	

REFERENCES
Fraser (1964); Seaton *et al.* (1978)

PROPERTY
RUN 1-18; XVM 1-25.

LOCATION
The property (Fig. VII-5) is about 380 miles (610 km) north-northeasterly of Yellowknife, and 15 miles (25 km) south of Grays Bay, on the east shore of the Anialik River.

HISTORY
The claims were staked in 1974. Mapping, airborne and ground geophysics were followed by eight drill holes totalling 610.3 meters (2,001 feet). These intersected copper and silver mineralization on the RUN claims.

DESCRIPTION
The RUN, XVM property covers part of the Run Lake Belt (Fig. VII-5) of acid to intermediate volcanics interbedded with calcareous and argillaceous units. Gossans have formed over disseminated chalcopyrite, pyrrhotite and pyrite as well as over stringers and pods of sulphides in felsic tuffs.

CURRENT WORK AND RESULTS
A horizontal loop EM survey outlined two northeast trending conductors flanked to the southeast by a magnetic high. Neither conductor has a gravity anomaly associated with it.

P, Q, R AND X CLAIMS	Gold, Base metals
Giant Yellowknife Mines Ltd.,	76 M/11
Yellowknife, N.W.T.	67°43'N, 111°30'W

REFERENCES
Fraser (1964); Gibbins *et al.* (1977); Padgham *et al.* (1976); Schiller (1965); Seaton (1978); Thorpe (1966).

PROPERTY
42 P; 20 Q; R 21, 28, 33; X 1-7.

LOCATION
The property (Fig. VII-5) is 370 miles (600 km) north-northeasterly of Yellowknife and 10 miles (16 km) south of Greys Bay.

HISTORY
The P, Q and R claims were staked in 1972 and the

X claims in 1973. All were acquired by Arcadia Exploration Limited in 1974. The area had been staked and explored previously (Padgham *et al.*, 1976). Drilling tested the North and Sidewalk Veins in 1974 and the North and East Boundary veins in 1975 (Gibbins *et al.*, 1977; Seaton, 1978). Giant Yellowknife Mines optioned the property in 1975.

DESCRIPTION

The claims cover part of a northerly branch of the Run Lake greenstone belt, which consists of intermediate to felsic metavolcanics and overlying metasediments cut by felsic intrusives and diabase dykes. Gold-bearing quartz veins on the property can be traced discontinuously for over a mile.

The gold is associated with pyrite, galena, chalcopyrite and hematite concentrated in the sheared and shattered walls of the veins. The North Vein trends northeast for roughly two miles in a syeno-diorite intrusion, is up to 7.5 feet wide and dips vertically. The East Boundary Vein trends north for 1,675 feet in syeno-diorite, is up to 10 feet wide, averages 4 feet wide and dips vertically.

CURRENT WORK AND RESULTS

Seven holes tested the North Vein and a gossan in the northern part of the property. Gold values were disappointing, but encouraging zinc and copper mineralization was found beneath the gossan.

PROSPECTING PERMIT 358	Copper, lead, zinc
Uranerz Exploration & Mining Limited,	cobalt, gold, silver
110, 7220 Fischer Street,	76 N/6
Calgary, Alberta.	67°20'N, 109°15'W

REFERENCES

Campbell (1978); Campbell and Cecile (1975, 1976); Fraser (1964); Gibbins *et al.* (1977).

PROPERTY

Prospecting Permit 358.

LOCATION

The property (Fig. VII-1) is about 370 miles (600 km) northeasterly of Yellowknife and 155 miles (250 km) southwesterly from Cambridge Bay.

HISTORY

Uranerz acquired Prospecting Permit 358 in April, 1975 to cover a strong zinc anomaly in lake sediments discovered during uranium reconnaissance. The northeastern part of the permit was relinquished in April, 1976.

DESCRIPTION

The northwesterly trending Bathurst Fault roughly parallels and lies close to the northeastern margin of the permit. Southwest of the fault Archean rocks of the Slave Province which consist of quartzites, mica schists and granitic rocks underlie the permit and in the southern part are intruded by northwesterly striking pegmatite and diabase dyke swarms. Northeast of the fault mainly Proterozoic rocks of the Goulburn Group are exposed. A small exposure of dark coloured slate at Gela Lake immediately east of the Bathurst Fault may be of Archean age.

CURRENT WORK AND RESULTS

Mapping, geochemical lake sediment and rock sampling covered an area mainly southwest of the Bathurst Fault. Some of the lake bottom sediments which were analysed for copper, lead, zinc and silver gave exceptionally high values. Seventy-eight rock samples were assayed for zinc, lead, copper, arsenic, gold and silver and 14 of these were selected for petrographical and mineralogical studies. The geochemical anomalies might be caused by vein type mineralization similar in style to that a few miles to the northwest of the permit at Galena Point.

Some of the conductors located by a 1975 airborne survey were tested by ground EM and attributed to graphitic and pyrrhotite bearing slates, fault zones or swamps.

BEW, CG, FO, FU, MM, RAL	Base metals
M & M Porcupine Gold Mines Ltd.,	86 H/15; I/1
P.O. Box 960, Station Q,	66°00'N, 112° 30'W
Toronto, Ontario, M5T 2P1.	

REFERENCES

Bau *et al.* (1978); Bostock (1967, 1976); Hyde *et al.* (1976).

PROPERTY

BEW 1-36; CG 1-35; FO 1-30; FU 1-36; MM 1-36; RAL 1-36.

LOCATION

The claim groups (Fig. VII-1 and 5) lie east of Takijuq Lake and northwest of Rockinghorse Lake at about 400 kilometers (250 miles) north-northeast of Yellowknife.

HISTORY

The claim groups were staked in 1974 following the discovery of a massive sulphide deposit at Izok Lake by Texasgulf Inc. in 1973. North Atlantic Resources Limited (N.P.L.) has a 50% interest in the claims.

DESCRIPTION

The claims are underlain by intermediate to mafic volcanic rocks and minor felsic volcanic rocks of the Point Lake Formation intruded by diorite plus minor amphibolite and younger granitic rocks.

CURRENT WORK AND RESULTS

EM and magnetic anomalies were outlined on claims CG 25, RAL 4, and RAL 11.

BOW CLAIMS	Base metals
Noranda Exploration Co. Ltd.,	86 H/10
P.O. Box 1619,	65°37'N, 112°45'W
Yellowknife, N.W.T.	

REFERENCES

Bostock (1967, 1976).

PROPERTY

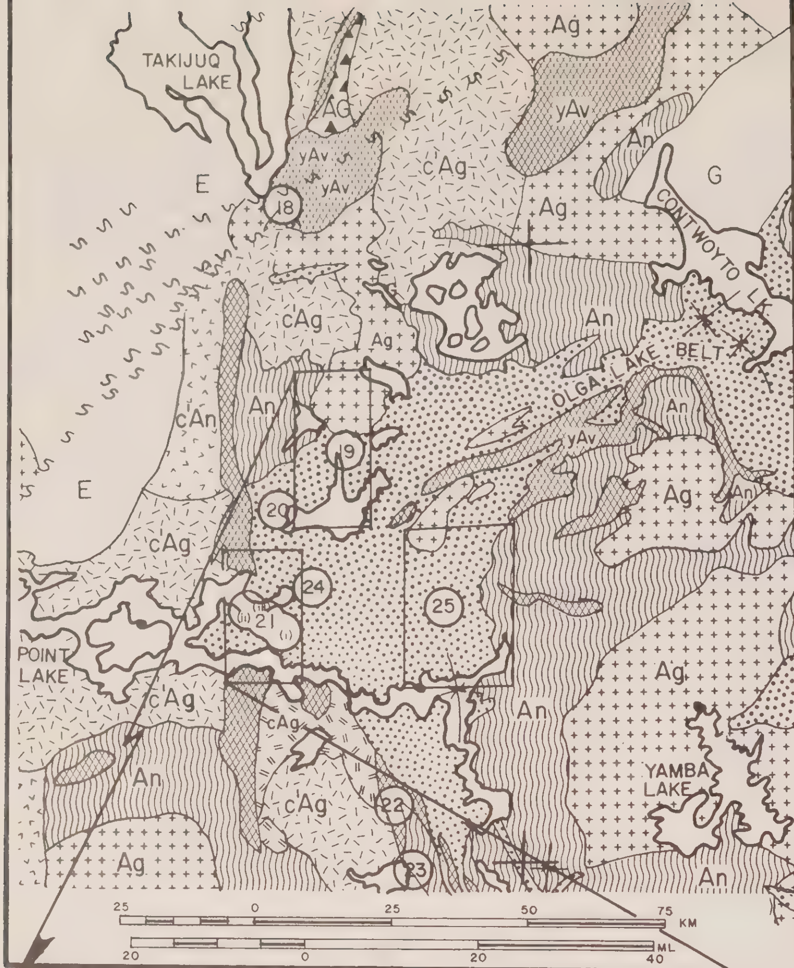
BOW 14-24, 29

LOCATION

The claim group is north of Itchen Lake, about 355 kilometers (220 miles) north-northeast of Yellowknife (Fig. VII-6).

HISTORY

The BOW claims were staked in 1975 when Texasgulf Inc. announced its discovery of a massive sulphide deposit at Izok Lake (Fig. VII-6).



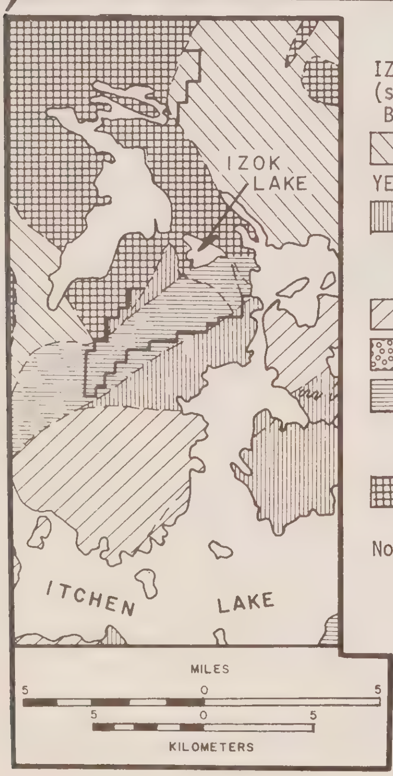
LEGEND

PROTEROZOIC
E. Epworth Group. G. Goulburn Group

ARCHEAN
Migmatite and granitic gneisses (c'An)* or granitic rocks (c'Ag) which may be in part older than the Yellowknife Supergroup.
Granitic rocks, undivided (Ag)
Granitic gneisses and migmatite and mixed gneisses involving Yellowknife Supergroup rocks (An)
Gabbro (Ab)

YELLOWKNIFE SUPERGROUP
Metasediments (yAwp, yAsdr)
Metavolcanics, undivided (yAv,yAvb)
Plutonic gneisses forming basement to Yellowknife Supergroup (cAg)
()* Units of McGlynn, 1977

Numbers as Fig. VII-1

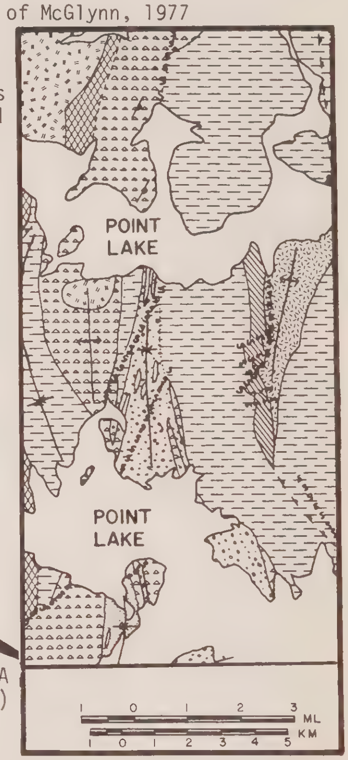


LEGEND

IZOK LAKE AREA (left) (simplified from Bostock, 1976)
Granitic intrusions

YELLOWKNIFE SUPERGROUP
Itchen formation - metaturbidites lacking iron formation lenses
Contwoyto formation
Keskarrah formation
Point Lake formation - metavolcanics and related metasedimentary rocks
Hybrid rocks

Note: For more detailed legend see Keskarrah Bay (right)



LEGEND

KESKARRAH BAY MAP-AREA (right)
Adamellite to granodiorite

YELLOWKNIFE SUPERGROUP (After Henderson and Easton, 1977)

Contwoyto Formation
Greywacke-mudstone to psammitic and pelitic schists with oxide, carbonate and silicate (sulphide) iron-formation.

Keskarrah Formation
Lithic sandstone with local volcanic units
Conglomerate with local volcanic units

Point Lake Formation
Rhyolite, mainly fragmental
Dacite, mainly fragmental
Basalt, andesite, mainly flows
Mafic tuffs

Granodiorite, abundant mafic dykes, older than Yellowknife supracrustal rocks.
Mixed gneisses, orthogneiss, paragneiss, granite and pegmatite, in part possibly older than Yellowknife supracrustal rocks

Bedding, Flow, top known
Anticline Syncline
Fault
Isograd (cordierite)

Figure VII-6: Point Lake - Itchen Lake area. Generalised geology and property locations.

DESCRIPTION
The underlying rocks are Archean mafic to felsic metavolcanics and metasediments of the Yellowknife Supergroup intruded by granitic rocks (Bostock, 1976).

CURRENT WORK AND RESULTS
The property was geologically mapped at a scale of 1 inch to 0.5 miles. Airborne EM and magnetic surveying outlined six anomalies mostly within intermediate to mafic volcanic rocks.

HAN CLAIMS	Copper, lead, zinc,
Texasgulf Inc.,	silver
Box 175,	86 H/10
5000 Commerce Court West,	65°39'N, 112°55'W
Toronto, Ontario, M5L 1E7.	

REFERENCES
Bostock (1967, 1976)

PROPERTY
HAN 1-4, 8.

LOCATION
The claims (Fig. VII-6) are north of Itchen Lake, about 360 kilometers (225 miles) northeast of Yellowknife.

HISTORY
In 1974 Texasgulf Inc. staked the HEN, HER, HIP, HAL and HAM claims to cover a massive sulphide showing at Izok Lake, one mile north of the north arm of Itchen Lake (Fig. VII-6).

In 1975 the HAN claims were staked west of Izok Lake.

DESCRIPTION
The claims are underlain by metavolcanics of the Point Lake Formation intruded by granitic rocks (Fig. VII-6).

CURRENT WORK AND RESULTS
Two hundred and sixty-four soil samples were analysed for copper, lead, zinc and silver. Two anomalies coincide with small pyrite-sphalerite-chalcopyrite-bearing gossans within intermediate tuffs.

CRAB CLAIMS	Copper, lead, zinc,
Great Plains Development Co.	silver, gold
of Canada Ltd.,	86 H/6, 10, 11
715, 5th Avenue S.W.,	65°30'N, 113°00'W
Calgary, Alberta, T2P 2X7	

REFERENCES
Bostock (1967, 1976)

PROPERTY
CRAB 1-229

LOCATION
The claims (Fig. VII-6) are on the west shore of Itchen Lake, about 345 kilometers (215 miles) north-northeast of Yellowknife.

HISTORY
CRAB 1-229 were staked in 1975 when Texasgulf Inc. announced its discovery of a massive sulphide deposit at Izok Lake (Fig. VII-) and are owned jointly with Rio Tinto Canadian Explorations Ltd.

DESCRIPTION
The property is underlain by altered mafic to intermediate flows and pyroclastics of the Yellowknife Supergroup intruded by granitic rocks.

CURRENT WORK AND RESULTS
The claims were geologically mapped at a scale of 1 inch to 1,000 feet. Rock samples collected from gossans assayed up to 0.005 oz/ton Au, 0.16 oz/ton Ag, 0.02% Cu, 0.03% Pb, and 0.03% Zn.

FOG, ROC CLAIMS	Copper, lead, zinc,
Texasgulf Inc.,	silver, gold
Box 175,	86 H/6
5000 Commerce Court West,	65°30'N, 113°00'W
Toronto, Ontario, M5L 1E7	

REFERENCES
Bostock (1967, 1976)

PROPERTY
FOG 15, 20, 25, 28, 41, 96; ROC 1-6.

LOCATION
The claims (Fig. VII-6) lie between Itchen and Point Lakes, about 320 kilometers (200 miles) northeast of Yellowknife.

HISTORY
The FOG and ROC claims were staked in 1975.

DESCRIPTION
The claims are underlain to the east by metaturbidites of the Contwoyto Formation containing iron formation lenses and to the west by felsic metavolcanics of the Point Lake Formation (Fig. VII-6).

CURRENT WORK AND RESULTS
Soil samples were analysed for copper, lead, zinc, silver and gold. One zinc-copper-lead anomaly was outlined on the FOG claims within interbedded felsic to intermediate tuffs and cherty felsic tuffs.

RETA CLAIMS	Copper, lead, zinc
Great Plains Development	86 H/6
Company of Canada,	65°25'N, 113°00'W
715, 5th Avenue S.W.,	
Calgary, Alberta, T2P 2X7	

REFERENCES
Bostock (1967, 1976); Henderson (1977).

PROPERTY
RETA 1-64

LOCATION
The property (Fig. VII-6) lies between Itchen and Point Lakes, about 320 kilometers (200 miles) north of Yellowknife.

HISTORY
In 1973 Great Plains Development Company of Canada Ltd. discovered minor copper-lead-zinc mineralization in metagreywacke on the northeast arm of Point Lake. One rock sample assayed 1,160 ppm Cu and 300 ppm Ni. After Texasgulf Inc. announced its discovery of a massive sulphide deposit at Izok Lake in 1975, Great Plains Development Company of Canada staked the RETA claims gossan in 1976.

DESCRIPTION
The country rocks are mainly Point Lake Formation

mafic flows and tuffs with minor felsic volcanics and Contwoyto Formation metaturbidites containing iron formation (Bostock, 1976; Henderson, 1977).

CURRENT WORK AND RESULTS

Geological mapping at a scale of 1 inch to 1,000 feet found thin, conformable quartz-rich layers containing up to 10% disseminated sulphides in small wedges of metasediments within andesite flows and tuffs. The copper-lead-zinc gossan found in 1973 was resampled in 1976 giving assays of 0.32% Cu, 0.36% Pb, 1.05% Zn, 0.005 oz/ton Au and 0.40 oz/ton Ag.

ROB, ROR, RUT CLAIMS Texasgulf Inc., Box 175, 5000, Commerce Court West, Toronto, Ontario, M5L 1E7	Copper, zinc, lead, silver 86 H/6 65°30'N, 113°00'W

REFERENCES

Bostock (1967, 1976)

PROPERTY

ROB 4, 5, 9, 10, 20, 21, 61, 62, 67-70, 73-76; ROR 4-6, 9, 10, 14-16, 25; RUT 1-6, 8-9, 11-13.

LOCATION

The claim (Fig. VII-6) groups lie between Itchen and Point Lakes, about 320 kilometers (200 miles) northeast of Yellowknife.

HISTORY

In 1974 Texasgulf Inc. staked the HEN, HER, HIP, HAL and HAM claims to cover a massive sulphide showing at Izok Lake, one mile north of the north arm of Itchen Lake.

In 1975 the company staked the ROB, ROR and RUT claims to the south of Itchen Lake.

DESCRIPTION

The claims are underlain by metavolcanic rocks of the Point Lake Formation (Fig. VII-6) (Bostock, 1976).

CURRENT WORK AND RESULTS

Soil samples, collected and analysed for copper, lead, zinc and silver, outlined eight copper-zinc anomalies. One anomaly coincides with two pyrite-chalcopyrite-bearing gossans and another with a galena-chalcopyrite-sphalerite gossan.

MARG CLAIMS Canadian Shield Explorations Limited, c/o Trigg Woollett and Associates Limited, 10504, 103 Street, Edmonton, Alberta.	Copper, lead, zinc 86 A/16 64°52'N, 112°20'W

REFERENCES

Fraser (1969); Map 1219A Winter Lake.

PROPERTY

MARG 1-18

LOCATION

The property (Fig. VII-6) lies on the west shore of Providence Lake 283 kilometers (176 miles) north-northeast of Yellowknife.

HISTORY

The claims were staked in 1976 and are currently owned by Canadian Shield Exploration Ltd.

DESCRIPTION

The property is underlain by northwest-striking and east-dipping Yellowknife Supergroup, amphibolite and metarhyolite containing gossans and lenses of pyrrhotite, pyrite and minor chalcopyrite.

CURRENT WORK AND RESULTS

Geochemical soil samples assayed up to 190 ppm Cu, 20 ppm Pb, and 49 ppm Zn. Ground VLF EM and magnetic surveys outlined three conductors and two magnetic anomalies.

MARS CLAIMS Canadian Shield Exploration Limited, c/o Trigg Woollett and Associates Limited, 10504, 103 Street, Edmonton, Alberta.	Copper, zinc, lead 86 H/2 65°03'N, 112°41'W

REFERENCES

Bostock (1967, 1976)

PROPERTY

MARS 1-21

LOCATION

The property (Fig. VII-6) is south of Point Lake, about 298 kilometers (185 miles) north-northwest of Yellowknife.

HISTORY

MARS 1-21 were staked in 1976 to cover a pyrrhotite-minor chalcopyrite occurrence. The claims are currently owned by Canadian Shield Exploration Ltd.

DESCRIPTION

The claims are underlain by Archean mafic and felsic volcanic rocks, biotite schist and graphitic argillite of the Point Lake Group.

CURRENT WORK AND RESULTS

Soil samples assayed from 2 to 78 ppm Cu; 3 to 17 ppm Pb and 6 to 166 ppm Zn.

Ground EM and magnetic surveys outlined one conductor and two magnetic anomalies coincident with an area of frost-heaved, float that contains disseminated pyrrhotite and pyrite, minor chalcopyrite and sphalerite. Samples assayed up to 0.82% Cu and 2.05% Zn.

PROSPECTING PERMIT 432 Hudson Bay Oil & Gas, 700-2 Street S.W., Calgary, Alberta, T2P 2W1	Copper, lead, zinc, silver 86 H/8 65°15' - 65°30'N 112°00' - 112°30'W

REFERENCES

Bostock (1967, 1976); Fraser (1960).

PROPERTY

Prospecting Permit 432

LOCATION

The permit (Fig. VII-6) is northeast of Point Lake, about 336 kilometers (210 miles) north-northeast of Yellowknife.

HISTORY

Canadian Nickel Company discovered gold on

Contwoyto Lake in 1961 and staking rush followed. Gold interest died away and the area was ignored until Texasgulf discovered a silver-basemetal deposit at Izok Lake in 1975. Hudson Bay Oil and Gas acquired Prospecting Permit 432 in 1976 in the hopes of finding favourable volcanic units in the area.

DESCRIPTION
The area is underlain by felsic to mafic metavolcanics of the Point Lake Formation, metaturbidites of the Itchen Formation and granitic intrusions. Diabase dykes and sills cut the above formations.

CURRENT WORK AND RESULTS
The permit area was explored by geological mapping at a scale of 1 inch to 0.5 miles, IP surveys and rock chip and soil sampling.

In the northeast corner one rock chip sample assayed 380 ppm Cu, 175 ppm Pb, 2000 ppm Zn and 4 ppm Ag, another assayed 1200 ppm Cu, and five others greater than 350 ppm Zn and 1.0 ppm Ag except for one which assayed 270 ppm Zn.

In the northwest several rock chip samples contained up to 5% pyrite and pyrrhotite. One assayed 200 ppm Cu, 620 ppm Pb, 105 ppm Zn and 17 ppm Ag and another 235 ppm Cu.

HOOD, HOOD-A, HOOD-B AND HOOD-C CLAIMS	Copper, zinc
Texasgulf Inc.,	86 I/2
Box 175,	66°10'N, 112°43'W
5000, Commerce Court West,	
Toronto, Ontario, M5L 1E7	

REFERENCES
Gibbins *et al*. (1977); Hyde *et al*. (1976); Seaton (1978).

PROPERTY
HOOD 1-200; HOOD-A 1-88; HOOD-B 1-98; HOOD-C 1-50.

LOCATION
The claims (Fig. VII-5) are 255 miles (410 km) northerly of Yellowknife and east of the southern end of Takijuq Lake.

HISTORY
Ecstall Mining Limited, a wholly owned subsidiary of Texasgulf Inc. staked claims on ground they had held zince 1973 as Prospecting Permit 296. Ecstall Mining changed their name to Texasgulf Canada Ltd. in 1975.

Prospecting Permit 296 was explored by airborne and ground geophysics, mapping and geochemical surveys. Drilling outlined basemetal deposits (Seaton, 1978).

DESCRIPTION
The claims are in the southern part of 85 I/2 which is underlain dominantly by volcanics. A felsic volcanic pile underlies a one- by five-mile area and is flanked by intermediate to mafic volcanics. The A grid massive sulphides are in the south-central part of this felsic pile. The volcanics trend northeasterly, near Takijuq Lake, and easterly at the eastern edge of the permit area (Hyde *et al*., 1976).

The HOOD and HOOD-A, B and C claims comprise a large central and three small outlying blocks.

CURRENT WORK AND RESULTS
Geophysics and drilling tested targets in volcanics.

SOUTHERN SLAVE PROVINCE

Only one base metal project is reported from Southern Slave Province. The following references are to one inch to four mile geological maps:

Brown (1950b); Folinsbee (1949); Fraser (1969); Henderson and Jolliffe (1937); Moore *et al*. (1951).

More recent mapping compiled by Henderson (1976) covers NTS 85 I and 85 J. References of more local or specific type are included with individual project reports.

TUNDRA PROJECT	Base metals, gold
Noranda Exploration Co. Ltd.,	75 M/12, 76 D/2,3,5,6
P.O. Box 1619	64°10'N, 111°20'W
Yellowknife, N.W.T.	

REFERENCES
Folinsbee (1949); Lord (1951); Moore (1956); McGlynn (1971); Seaton (1978).

PROPERTY
Several claim groups were staked by Noranda in the course of this project. The BUD claim optioned from C. Vaydik is included.

LOCATION
The Tundra Project, about 150 miles (240 km) northwesterly of Yellowknife, covers the 40-mile (65 km) long Courageous Lake volcanic belt and two smaller separate nearby areas (Fig. VII-7).

HISTORY
The Courageous Lake belt has been explored over many years mainly for gold, particularly in the Matthews Lake area where there are the Tundra Mine and Salmita gold properties.

DESCRIPTION
The Courageous Lake volcanic belt is composed mainly of mafic lavas, felsic lavas, tuffs, coarse pyroclastics and sill-like bodies of metagabbro. It is flanked on the west by intrusive granodiorite and diorite and on the east by metasediments. The belt forms a generally east facing and steeply eastward dipping homoclinal sequence. The overlying metasediments are isoclinally folded.

CURRENT WORK AND RESULTS
A 373 line-mile airborne EM and magnetometer survey and reconnaissance mapping, at one inch to half mile, explored the Courageous Lake volcanic belt. Claims were staked as a result of these surveys.

Reconnaissance geology only covered the two outlying areas.

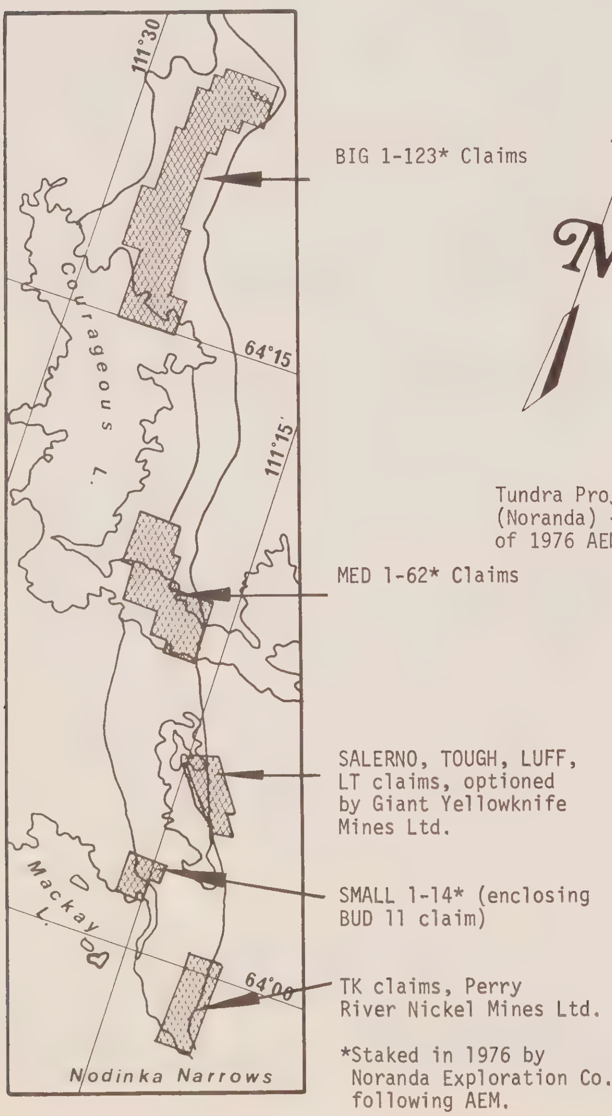
GOLD AND SILVER EXPLORATION

Eight of the ten properties described are in the Southern Slave Province. On one property gold occurs in metamorphosed iron formation. In the remaining nine properties the exploration target was auriferous

LEGEND

5	Granitoid rocks including biotite granodiorite quartz diorite, hornblende-quartzdiorite, hornblende diorite.
	YELLOWKNIFE SUPERGROUP
4 | 4a	Metasediments: Greywacke, phyllite and mica-schist; 4a nodular schist.
3	Metagabbro (may in part be younger than 4)
2	Felsic volcanics: Includes massive flows, agglomerate, tuff and breccia. Locally interbedded with metasediment.
1	Mafic volcanics: Includes massive, pillowed, amygdaloidal, ropy and fragmental varieties. Locally carbonatised or schistose.
1,2	Undivided mafic and felsic volcanics.

Not Shown:
Gabbro and diabase dykes younger than 5 and small quartz porphyry, quartzfeldspar porphyry, feldspar porphyry and aplite intrusions.



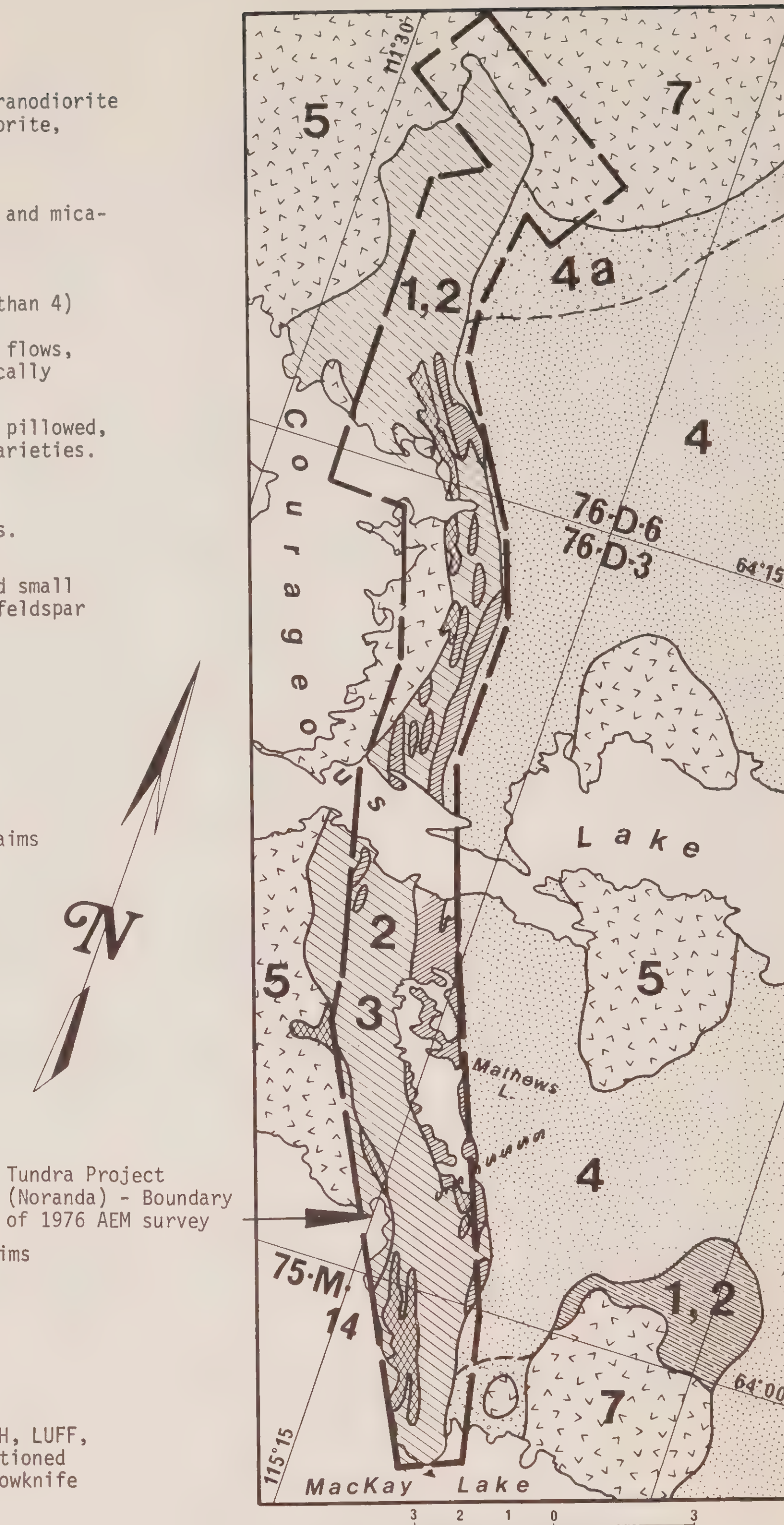


Figure VII-7: Courageous Lake volcanic belt. Property location map (left). Generalised geology (above), after Folinsbee (1949) and Moore (1956).

quartz veins or shear zones, which, with one exception, cut Yellowknife Supergroup rocks.

Though entitled 'Gold and Silver Exploration' this section excludes exploration for silver occurring with massive base metal sulphides.

Properties are reported in the order shown in Figure VI-1.

REN CLAIMS | Gold
Texasgulf Inc., | 86 H/6, 7
Box 175, | 65°23'N, 112°58'W
5000 Commerce Court West,
Toronto, Ontario, M5L 1E7.

REFERENCES
Bostock (1967, 1976); Henderson (1977); Laporte *et al.* (1978).

PROPERTY
REN 1, 12, 14, 30.

LOCATION
The claims lie between Itchen and Point Lakes, about 320 kilometers (200 miles) northeast of Yellowknife (Fig. VII-6).

HISTORY
The REN claims were staked in 1975.

DESCRIPTION
The property is underlain by metaturbidites containing iron formation lenses of the Contwoyto Formation (Bostock, 1976; Henderson, 1977).

CURRENT WORK AND RESULTS
Seven holes, totalling 2,749 feet (838 meters), were drilled. Cores contained trace amounts of copper and up to 0.02% Zn, 0.22 oz/ton Au and 0.34 oz/ton Ag. The better gold values tend to occur in the metamorphosed iron formation.

TK CLAIMS | Gold
Perry River Nickel Mines Ltd., | 75 M/14, 76 D/3
217, 513-8th Avenue S.W., | 64°00'N, 111°10'W
Calgary, Alberta, T2P 1G3.

REFERENCES
Folinsbee and Moore (1950); Lord (1951); Moore (1956).

PROPERTY
TK 1-40.

LOCATION
The claims (Fig. VII-7) are 145 miles (235 km) northeasterly of Yellowknife and extend three and one half miles (5.5 km) north of MacKay Lake.

HISTORY
Gold showings were discovered and staked as the ROMA and JETA claims in 1945 on ground now covered by the TK claims.

In 1950 Homer Yellowknife Mines mapped and trenched on the ROMA and JETA claims and tested two auriferous zones by drilling eight holes for a total of 2,015 feet. Seven holes explored the No. 1 zone and one hole tested the parallel striking No. 2 zone which lies 800 feet to the west (Fig. VII-).

The ROMA and JETA claims lapsed, were restaked as the DON claims and explored in 1958 by North Goldcrest Mines Limited, who mapped, trenched and sampled the showings and drilled 7,800 feet in 33 holes. The drilling tested the Nos. 1 and 2 zones and the No. 3 zone, a southward continuation of the No. 1 zone beyond Saucer Lake (Fig. VII-).

In 1973 Golden Ram Resources Limited did a VLF EM survey and sampled trenches.

DESCRIPTION
TK 1-40 lie on the eastern margin of the Courageous Lake volcanic belt, which in this area includes mafic and minor felsic volcanics. The volcanics are overlain to the east by greywacke and schist.

Gold, arsenopyrite, pyrite and pyrrhotite are associated with quartz veins which pinch, swell and locally form boudins. The Nos. 1 and 3 zones are at the contact between metavolcanics and metasediments. The No. 2 zone is enclosed in mafic metavolcanics.

CURRENT WORK AND RESULTS
The claims were explored by VLF EM and soil sampling. Trenches dug in previous years were examined.

The VLF EM survey outlined strong to weak conductors at or near the metavolcanics-metasediments contact. South of Saucer Lake three conductors parallel part of the No. 3 zone.

Four hundred and ninety-five soil samples were analysed for gold and arsenic. Seven anomalous zones were outlined.

Trigg Woollett and Associates' geologists, who conducted the 1976 surveys, concluded from a study of small scale structures that polyphase deformation has affected the rocks, producing a structure more complex than that postulated by Moore (1956).

SALMITA PROPERTY | Gold
Giant Yellowknife Mines Ltd., | 76 D/3
Yellowknife, N.W.T. | 64°03'N, 111°12'W

REFERENCES
Folinsbee and Moore (1950); Lord (1951); McGlynn (1971); Moore (1956); Seaton (1978).

PROPERTY
LT 1-3; LUFF 1-4; SALERNO 1-18; TOUGH 1-6.

LOCATION
The claims (Fig. VII-7) are on the east shore of Matthews Lake, about 240 kilometers (150 miles) northeast of Yellowknife.

HISTORY
In 1945 the SALERNO claims were staked for Salmita Northwest Mines Limited. In 1946 the LT claims were staked and in 1949, following the acquisition of the property by Salmita Consolidated Mines Limited, the TOUGH and LUFF claims were staked. In 1950 4,500 feet (1,372 meters) of drilling on the North showing outlined 19,500 tons of rock averaging 0.48 oz/ton Au in a 340-foot (105-meter) long, 4.5-foot (1.4 meter) wide zone of the B vein between the surface and the 150-foot (46-meter) level. In 1951 a 145-foot (44-meter) shaft was sunk with 116 feet (35 meters) of crosscutting and drifting at the 125-foot (38-meter) level. Samples from the B vein averaged 0.70 oz/ton Au and a 200 lb. bulk sample

tested by the Mines Branch, Ottawa, contained 0.93 oz/ton Au and 0.285 oz/ton Ag. Mack Lake Mining Corp. Limited optioned the property in 1954 and took over Salmita Consolidated Mines Limited in 1961. In 1973 the property was acquired by Bluebell Enterprises Limited and in 1974 optioned to Giant Yellowknife Mines Limited. In 1975 a decline was driven 959 feet (300 meters) on the T and B veins. Twenty underground holes, totalling 8,800 feet (2,682 meters), were drilled, and 135,000 tons, averaging 0.632 oz/ton Au to a depth of 600 feet (183 meters) were indicated.

DESCRIPTION

The country rocks are north-northwest striking sedimentary and volcanic rocks of the Yellowknife Supergroup intruded by granitic rocks. Gold-bearing quartz veins are found along shear zones near the sedimentary-volcanic contact. Vein minerals are calcite, tourmaline, pyrrhotite, arsenopyrite, scheelite, ferberite, galena, sphalerite and chalcopyrite.

The property covers four main showings. The North and South showings are mainly in felsic volcanics and the Olsen and Southwest showings in sediments. The North showing comprises six veins, two of which are the B and T.

CURRENT WORK AND RESULTS

About 10,600 feet (3,230 meters) of diamond drilling on the North showing failed to increase reserves beyond the 135,000 tons grading 0.632 oz/ton Au.

ROD CLAIMS	Gold
D. Nickerson,	85 J/8, 9
Yellowknife, N.W.T.	62°30'N, 114°26'W

REFERENCES

Henderson (1976); Schiller and Hornbrook (1964); Schiller (1965); Seaton (1978).

PROPERTY

ROD 1-11

LOCATION

ROD 1-11 are at the southwest end of Baker Lake, about 5 kilometers (3 miles) northwest of Yellowknife.

HISTORY

The area has been extensively explored and staked since gold was discovered on the CON claims in 1935.

In 1962, when gold-bearing quartz veins along fracture zones were discovered in granitic rocks west of Yellowknife, Rodstrom Yellowknife Mines Ltd. acquired the J, JC, C and R claim groups. Numerous gold occurrences were found and several were drilled. Two of them, the No. 15 and No. 22 veins on claim R1, were restaked in 1975 as the ROD claims by D. Nickerson. In 1975 two tons of handsorted material of about 3.92 oz/ton Au were stockpiled from vein No. 15.

DESCRIPTION

The claims are underlain by Archean granodiorite cut by north-trending, quartz-filled shear zones ranging from a few inches to several feet in width and containing native gold and minor amounts of pyrite, galena and chalcopyrite. Calculated reserves are 930 tons grading 1.43 oz/ton Au over a 3.6-foot (1.1 meter) width in vein No. 15 and 156 tons grading 2.74 oz/ton Au over a 2.5-foot (0.8-meter) width in vein No. 22. Inferred reserves of vein No. 15 are 1,540 tons grading 0.82 oz/ton Au over a 3.6-foot (1.1 meter) width.

CURRENT WORK AND RESULTS

Testing by Cominco Limited on a sample of ore assaying 2.264 oz/ton Au showed a recovery of 99.07% using standard cyanidation techniques.

YT CLAIMS	Gold
Nugget Syndicate	85 J/8
c/o Geophysical Engineering Limited,	62°22'N, 114°24'W
Suite 4900, P.O. Box 49,	
Toronto, Ontario, M5K 1E8	

REFERENCES

Henderson and Brown (1966); Henderson (1976); Seaton (1978).

PROPERTY

YT 1-72

LOCATION

The property is on the west side of Yellowknife Bay, about 16 kilometers (10 miles) south of Yellowknife.

HISTORY

The YT claims were staked in 1973. No previous work has been recorded but there is evidence of trenching and shallow drilling of quartz veins on claims YT 18, 20 and 24. Geophysical Engineering obtained exploration rights in 1975 and mapped the property.

DESCRIPTION

Archean mafic to intermediate metavolcanics and metagabbroic intrusives of the Yellowknife Supergroup underlie the property. Quartz and chlorite schist zones in the metagabbro contain minor pyrite, arsenopyrite and very fine disseminated chalcopyrite. Partially sheared pillow breccias exposed on claim YT 48 contain up to 10% very fine, disseminated pyrite and arsenopyrite.

CURRENT WORK AND RESULTS

Ground EM, magnetic and IP surveys were performed to find a southwest extension of the Campbell shear zone. None was found but three IP anomalies characteristic of disseminated sulphide deposits were outlined.

KAM CLAIMS	Gold
Kamcon Mines Limited,	85 J/8
c/o Cominco Limited,	62°21'N, 114°21'W
200 Granville Square,	
Vancouver, B.C.	

REFERENCES

Henderson (1976); Henderson and Brown (1966); McGlynn (1971).

PROPERTY

KAM 1-29

LOCATION

The claims are six kilometers (four miles) south of Yellowknife (Fig. II-4).

HISTORY

KAM 1-29 were staked in 1936 for Kamlac Gold Mines Limited. In 1942 the property was transferred to Consolidated Mining and Smelting Company and in

1947 to Kamcon Mines Limited. Drilling by Cominco tested the Campbell shear zone in 1975 and was in progress at the end of the year.

DESCRIPTION

The country rocks are Archean metabasalts and meta-andesites of the Kam Formation intruded by metagabbro sills. The Campbell shear zone which cuts these rocks consists of anastomosing chlorite and sericite schists containing quartz lenses and stringers mineralized with pyrite, arsenopyrite and gold.

CURRENT WORK AND RESULTS

Two holes on KAM 22 were completed, testing the Campbell shear zone at depths of 800 feet and 3,000 feet below surface.

TA-DS CLAIMS	Gold, silver
Terra Mining and Exploration Company Limited,	85 I/7
Suite 204, 8631-109 Street,	62°21'N, 112°45'W
Edmonton, Alberta, T6G 1E8	

REFERENCES

Baragar and Hornbrook (1963); Gibbins *et al.* (1977); Henderson (1941); Henderson (1976); Lord (1951); Seaton (1978).

PROPERTY

TA 1-6; DS 1-11.

LOCATION

The property (Fig. VII-1) is in the Bullmoose Lake area 6.4 kilometers (4 miles) west of Francois Lake and 84 kilometers (52 miles) east-southeast of Yellowknife. A 51-kilometer (32-mile) winter road connects the property with the mouth of the Francois River.

HISTORY

The TA claims were staked for Cominco Limited in 1939 when gold-bearing quartz veins were discovered. In 1941 an inclined shaft was sunk on vein No. 4 and a small mill put into operation. Duke Mining Limited acquired the property in 1967 and in 1968 sampled and trenched around the shaft. The best surface vein sample assayed 13.72 oz/ton Au and 2.80 oz/ton Ag over one foot (0.3 meters). In 1969 and 1970 diamond drilling totalling 10,485 feet (3,196 meters) in sixty-two holes intersected quartz veins assaying up to 31.15 oz/ton Au over 0.4 feet (0.1 meters), 16.89 oz/ton Au over 1.2 feet (0.4 meters) and 2.88 oz/ton over 2.8 feet (0.9 meters). In 1972 1,428 feet (435 meters) of drilling intersected some narrow quartz veins on the downward projection of No. 3 and No. 4 veins that contained trace amounts to 0.54 oz/ton Au. Terra Mining and Exploration Company Limited optioned the property in 1974 and started underground development in 1975. This earned them a 50% interest in the property. A decline was sunk and drifting cut the No. 2 vein at the 70-foot (21-meter) level. Grades ranged from 0.01 oz/ton Au to 1.7 oz/ton Au over 3.7 feet (1.1 meters). About 2,600 tons of rock grading 0.4 oz/ton Au were stockpiled.

DESCRIPTION

The country rocks are nodular, schistose metagreywackes, phyllites and fine-grained mica schists of the Yellowknife Supergroup. Quartz veins mostly lie parallel to the enclosing strata. The four veins which have been explored contain pyrite, arsenopyrite, scheelite and gold.

Vein No. 1, exposed for 430 feet (130 meters) along strike, contains a 50-foot (15-meter) by 1.4-foot (0.4-meter) zone grading 0.5 oz/ton Au. Vein No. 2, exposed for 1,250 feet (380 meters) along strike, contains a 300-foot (90-meter) by 0.6-foot (0.2-meter) zone grading 3.69 oz/ton Au. Vein No. 3, 1.5 feet (0.5 meters) wide and exposed 1,500 feet (460 meters) along strike, contains a 120-foot (37-meter) by 1.5-foot (0.5-meter) shoot grading 0.3 oz/ton Au. Vein No. 4 is exposed for 625 feet (190 meters) along strike.

CURRENT WORK AND RESULTS

The decline advanced 913 feet (278 meters) during the year, reaching the target area 220 feet (67 meters) below surface where 536 feet (163 meters) of drifting and crosscutting explored the No. 4 vein. Gold mineralization is erratic but high grade in places. Drilling indicated 1.0 oz/ton Au over a 300-foot (90-meter) length and 6-foot (1.8-meter) width.

RIBB CLAIMS	Gold
Duke Mining Limited,	85 I/14
7107-83 Street,	62°47'N, 113°25'W
Edmonton, Alberta T6C 2Y1	

REFERENCES

Gibbins *et al.* (1977); Henderson (1976); Henderson and Jolliffe (1941); McGlynn (1971).

PROPERTY

RIBB 1-6

LOCATION

The claims are at Mitchell Lake, about 65 kilometers (40 miles) northeast of Yellowknife.

HISTORY

The property was first staked as the CHICK claims in 1952 after gold was discovered in 1948 on the MITCHELL-BEVAN claims to the southeast. In the mid-50's the property was held by Beneventum Syndicate and in 1956 by Beneventum Mining Co. Ltd. who did some stripping, trenching, sampling and diamond drilling. The claims were restaked as the RIBB claims in 1972 by A. Mandeville and transferred to Duke Mining Ltd. in 1974.

DESCRIPTION

The claims are underlain by argillite, greywacke and quartz mica schist of the Yellowknife Supergroup cut by two shear zones containing lenses and veins of gold-bearing quartz. The No. 1 vein, which strikes 145° has been traced for 450 feet (137 meters) and attains a maximum width of 10 feet (3 meters) at the nose of a tight fold. The narrower No. 2 vein which trends 115° has been traced for 300 feet (90 meters) and is 1 to 4 feet (0.3 to 1.2 meters) wide.

CURRENT WORK AND RESULTS

Five holes totalling 1,026 feet (313 meters) were drilled on the No. 1 vein and four holes totalling 978 feet (298 meters) on the No. 2 vein. About 3,000 tons of quartz grading 1.5 oz/ton Au were outlined in a 60-foot (18-meter) long, 5-foot (1.5-meter) wide and 120-foot (37-meter) deep shoot of the No. 1 vein.

ALICE CLAIMS
United Cambridge Mines Ltd.,
211, 543 Granville Street,
Vancouver, B.C., V6C 1X8

Gold
85 I/16
62°51'N, 112°20'W

REFERENCES
Henderson (1976); Henderson and Jolliffe (1941); Lord (1951); Thorpe (1972a).

PROPERTY
ALICE 1, 2, 4, 5.

LOCATION
The claims (Fig. VII-1) are east of Sunset Lake, a widening in the Beaulieu River, about 115 kilometers (70 miles) northeast of Yellowknife.

HISTORY
F.W. Thompson of Thompson Prospecting Syndicate staked ALICE 1-22 in 1938. In 1945 Sunset Yellowknife Mines Ltd. acquired the property and completed 3,249 feet (990 meters) of drilling on two shear zones. From 1946 to 1947 a vertical shaft was sunk on the Alice shear zone with drifts at the 125-foot (38-meter) level. In 1966 Giant Yellowknife Mines Ltd. optioned and did geological and EM surveying on the property and diamond drilled a total of 470 feet in four holes. One hole intersected 18 inches (46 cm) assaying 0.085 oz/ton Au. The property was idle until 1976 when it was acquired by United Cambridge Mines Ltd.

DESCRIPTION
The claims are underlain by northwest striking, basic to intermediate flows and tuffs of the Yellowknife Supergroup. These rocks have been intensely sheared, especially along tuffaceous beds. The Alice shear zone, exposed for about 900 feet (274 meters) and ranging from 1 to 20 feet (0.3 to 6.1 meters) wide, contains sericite and chlorite schists with scattered veinlets and lenses of quartz and pyrite. Gold is found where pyrite is abundant.

CURRENT WORK AND RESULTS
Ground EM and magnetic surveys outlined three conductors with weak magnetic correspondance.

NAHANNI REGION

C. Lord
D.I.A.N.D., Geology Office, Yellowknife

The Nahanni Region extends from Inuvik south to Fort Simpson and from the mountains just east of the Mackenzie River to the Yukon border.

The decline in exploration in this region since 1972-1973 continued into 1976. High inflation rates, economic recession, low metal prices and a change in metal commodity explored for, are the main reasons attributed for this decline.

Nevertheless, companies such as Shell, Rio Canex and Canex Placer were still searching for stratabound copper in the Redstone River Formation, zinc-lead in Helikian carbonates and stratiform lead-zinc in Road River shales in the Howard's Pass area (Fig. VIII-1).

Exploration ranged from prospecting to the fully integrated use of geochemistry, geophysics, detailed geological mapping and diamond drilling.

The following descriptions of properties in the Mackenzie Mountains are listed by metal commodity, geological environment and N.T.S. They are divided into:

(1) Stratabound copper in red-bed sequences
(2) Stratiform lead/zinc in shales
(3) Carbonate hosted zinc/lead
(4) Barite

STRATABOUND COPPER OCCURRENCES ASSOCIATED WITH REDBEDS

The Redstone River and overlying Coppercap Formations have been prospected for copper since the 50's and early 60's.

The Redstone River Formation was deposited in a shallow marine basin and consists of calcareous siltstones and mudstones interbedded with gypsum and gypsiferous siltstones. In the Keele River and Coates Lake area, the transition zone with the overlying Coppercap Formation contains sheet-like and lensoid bodies of dolomitized cryptalgal micritic carbonate. These carbonate lenses were deposited under conditions similar to those that exist today in the sabkha environment along the Trucial Coast of the Persian Gulf. The lenses occur mainly in embayments of the Redstone basin shoreline between locally developed fan-conglomerates in the Keele River, Hayhook Lake and Coates Lake areas (Fig. VIII-2).

These dolomitized carbonate members are the host rocks for most of the copper deposits. The copper minerals appear to be vertically zoned in the sequence, chalcocite-bornite-chalcopyrite to pyrite which represents a decrease in the copper and increase in the iron content of the sulphides. Silver, which behaves similarly to copper in its ability to form chloride complexes, is present in minor to trace amounts. The copper sulphides are disseminated in the carbonate lenses and also infill the fenestral fabrics implying an early post lithifaction deposition for the copper.

A genetic model of copper deposition similar to that proposed by Renfro (1974) and modified somewhat by the later work of Rose (1976) and Jacobson (1975) has been applied to this copper belt. In this model copper is leached from the underlying clastic rocks by circulating brine solutions and deposited when reducing conditions are encountered such as in decaying algal mattes. The decaying algal mattes of this model are possibly represented by the cryptalgal micritic carbonates of the Redstone River Formation. For a detailed description of the stratigraphy and type of mineralization refer to Jefferson (1978).

The copper belt was explored by Canico in the Mountain River area, Rio Canex and Cominco in the Hayhook Lake area and by Shell Canada in the Keele River and Coates Lake area (Fig. VIII-2). Exploration used a combined approach of prospecting, geochemical and geophysical surveys, detailed stratigraphic studies and diamond drilling.

CHASE CLAIMS	Copper
Cominco Limited	95 M/3
200, Granville Square,	63°10'N, 127°07'W
Vancouver, B.C.	

REFERENCES
Eisbacher (1976, 1977); Gabrielse *et al.* (1973); Jefferson (1978).

PROPERTY
29 CHASE claims

LOCATION
The CHASE claims are 242 km (150 miles) south of Norman Wells and 105 km (65 miles) southeast of the Canol Road.

HISTORY
The claims were staked for Cominco in 1975 in the area covered by Geological Survey of Canada Open File Report No. 298 which described a new copper occurrence in Redstone River Formation.

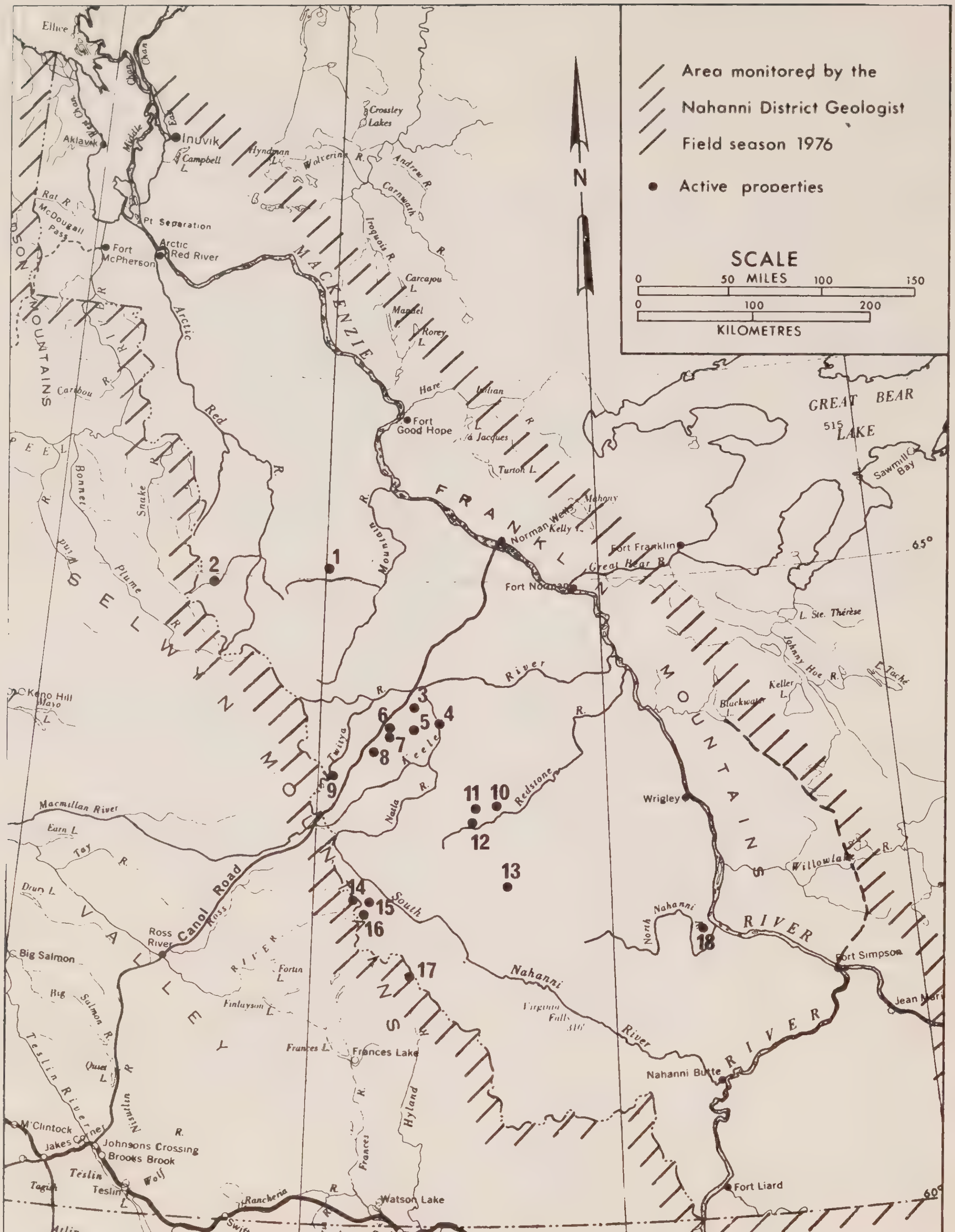
DESCRIPTION
Units of the Little Dal, Redstone River, Coppercap, Rapitan and Cambrian-Ordovician Brokenskull Formations underlie the claims.

CURRENT WORK AND RESULTS
Geochemical surveys, prospecting, mapping and stratigraphic studies explored the claims. Prospecting found malachite stained float of the Redstone River, basal Coppercap and Rapitan Formations but no mineralization was located in situ.

HAYHOOK PROPERTY	Copper
Rio Tinto,	95 M/6, 7
615 - 2 Bentall,	63°25'N, 127°05'W
Vancouver, B.C.	

REFERENCES
Eisbacher (1976, 1977); Gabrielse *et al.* (1973); Jefferson (1978); Yeo (1978).

PROPERTY
CL 1-467; DM 1-96.



1) RT
2) ARC
3) TET-RAP
4) KEEL PERMIT
5) NITE
6) TEE
7) BA
8) HORSESHOE
9) WISE
10) CAP
11) HAYHOOK PROPERTY
12) CHASE
13) COATES LAKE OPTION
14) Y
15) NOR
16) PESO
17) TUNGSTEN
18) CAM

Figure VIII-1: Active Properties in the Nahanni Region, 1976.

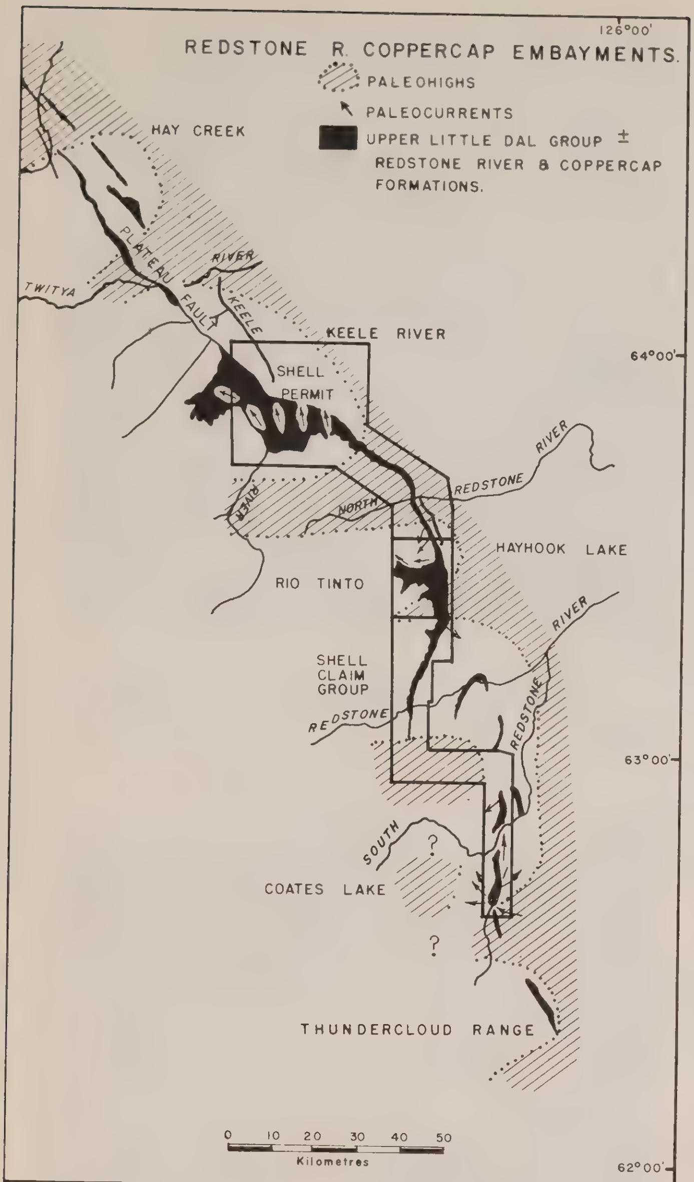


Figure VIII-2: Location and paleogeography of the Redstone copper belt. The map shows the outcrop distribution of the upper carbonate subunit of the Little Dal Group, and the Redstone River and Coppercap Formations together in black. The Redstone River and Coppercap Formations are present only in the non-hachured embayment areas and thin markedly toward the margins (dotted line) of the embayments.

LOCATION

The claims are 210 km (126 miles) south of Norman Wells and 13 km (8 miles) west of Hayhook Lake (Fig. VIII-2).

HISTORY

In 1975 Cordilleran Engineering Ltd., acting on behalf of Rio Tinto, found several geochemical copper anomalies during surveys of the Little Dal and Redstone River Formation. 563 claims were staked that year.

DESCRIPTION

The property covers Proterozoic Little Dal, Redstone River, Coppercap Formations unconformably overlain by Rapitan and Keele Formations.

The Redstone River Formation occurring in the Hayhook embayment of the Redstone basin, consists of a sequence of red carbonaceous and gypsiferous sandstones, siltstones, mudstones and shales. Conglomerates and dolomitized mounds occur locally along the shoreline of the basin. The conglomerates are mainly composed of rounded pebbles of Little Dal Formation in a carbonate and sandy matrix deposited in an alluvial fan environment.

The dolomitized mounds represent local algal development on topographic highs and in depressions along the shoreline similar to algal accumulations in the Keele embayment. Copper in the Hayhook area is found as disseminations and filling fenestral fabrics in the dolostones.

A facies model for the Redstone River Formation is shown in Figure VIII-3. Lithologies and sedimentary structures in these rocks are representative of deposition in tidal to supratidal environments (Fig. VIII-4, Troup, Jowett, C., 1976).

CURRENT WORK AND RESULTS

The property was mapped at a scale of 1:5,000, fourteen stratigraphic sections measured, geochemical stream sampling surveys done and the contact of the Redstone River and Coppercap Formations, prospected.

NITE OPTION, Shell Canada Ltd., Shell Building, Calgary, Alta.	Copper 105 I/16 63°50'N, 128°12'W

REFERENCES

Coates (1964); Eisbacher (1976, 1977); Gabrielse *et al.* (1973); Jefferson (1978); Lord (1978); Yeo (1978).

PROPERTY

143 NITE, JOAN, ANN, LOU, WEN and PAM Claims.

LOCATION

The claims are in Sayunei Range of the Backbone Ranges, Mackenzie Mountains, about 210 km (125 miles) southwest of Norman Wells.

HISTORY

The NITE claims were staked in 1972 by prospector P. Risby and later transferred to Welcome North. In 1974 Geomont Exploration Company dropped an option on the claims after exploring them by trenching, prospecting, mapping and diamond drilling. Later in 1974 Shell Canada optioned the claims and staked the JOAN, ANN, LOU, WEN and PAM in 1975.

DESCRIPTION

Proterozoic Coppercap and Rapitan Formations underlie the claims.

The Coppercap Formation, the oldest strata exposed, consists of a sequence of limestones and dolomitic limestones, 281 meters thick. Apparently conformably overlying the Coppercap is the Lower Rapitan Formation which consists of a succession of fine grained maroon and buff coloured siltstones interbedded with pebble to boulder size lens shaped conglomerates.

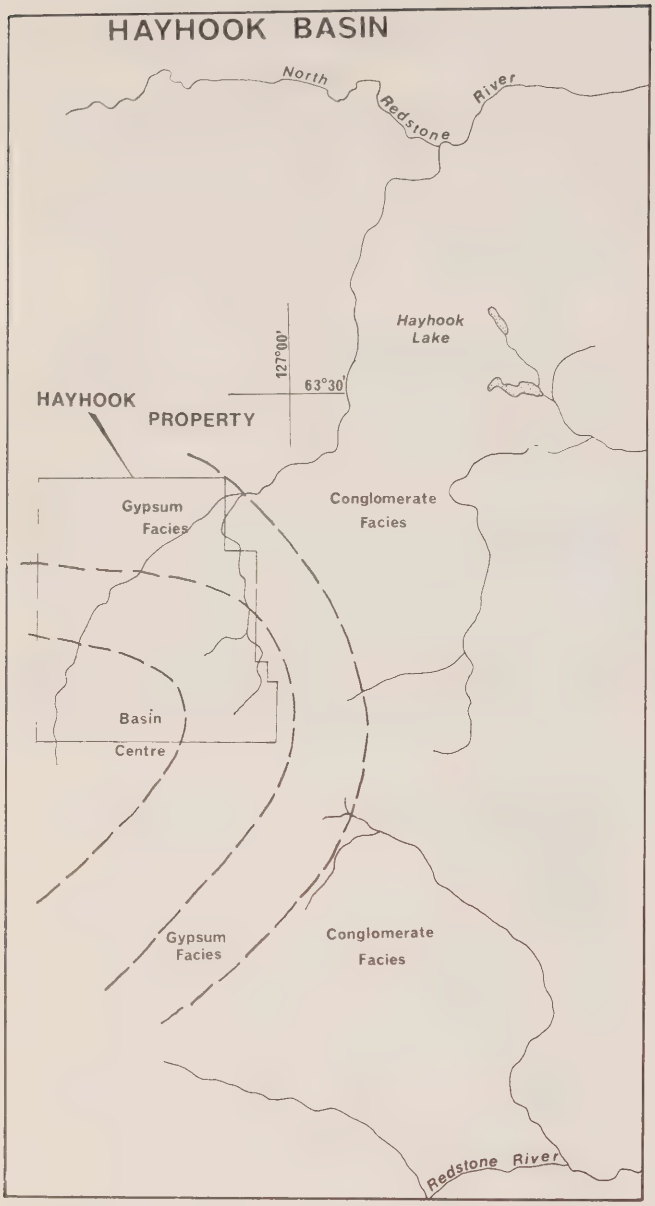


Figure VIII-3: Facies distribution map of the Redstone River Formation on the Hayhook Property after Troup, 1976.

The Middle Rapitan consists of diamictites deposited as a tilloid of glacio-marine origin. Bedding is rare and the clasts, commonly of carbonate, are sub-angular to sub-rounded in shape, from sand to boulder size, and are generally unsupported in a calcareous silt or mud matrix.

Bornite, tetrahedrite, chalcocite and chalcopyrite were found filling well developed fractured systems in a massive to algal laminated dolostone of the Coppercap.

Minor chalcocite was found in dolomitic siltstone lenses of the Lower Rapitan.

CURRENT WORK AND RESULTS

The claims were prospected, mapped and stratigraphic studies done.

KEELE-COATES LAKE AREA, Copper
Shell Canada Ltd., 95H - 105I
Shell Building,
Calgary, Alta.

REFERENCES

Coates (1964); Eisbacher (1976, 1977); Gabrielse *et al.* (1973); Jefferson (1978); Lord (1978); Yeo (1978).

PROPERTY

Prospecting Permit 361, RUM 1-24; 513 JUNE, JO, LOU, WEN, PAM, RETA, FAY, JOAN, ANN Claims and 3,717 MI, RA, DO, SH, FA, VT, SOL, LH, SI, HVT, HORSE, RN Claims.

LOCATION

The area explored covers most of the Redstone copper belt from the Keele River to Coates Lake in map areas 95M and 95L.

HISTORY

In 1975 Prospecting Permit 361 was acquired and the claims staked.

DESCRIPTION

The permit and claims cover most of the Redstone River and Coppercap Formations exposed between the Keele River and Coates Lake (Fig. VIII-2). Rhythmically bedded Redstone Formation consisting of maroon to red sandstones, siltstones, mudstones, dolostones and evaporites are well exposed in section on permit 361 just east of the Keele River.

The majority of the copper showings in the transition zone with the overlying Coppercap are related to mound-like lenses and sheets of algal laminated dolostone that occur predominantly just off shore or along the shoreline of the Keele embayment of the Redstone basin.

The claims cover outcrops of Redstone River Formation and its lateral extension under the Coppercap and Rapitan Formations west and south of the permit.

The outcrops are small and exposed in creeks and on ridge tops of a southeasterly trending range of mountains extending to Coates Lake.

Malachite, azurite, chalcocite, bornite, chalcopyrite and pyrite are found infilling fenestrae and as disseminations in thin beds of dolomitized micrites and cryptalgal laminated calcareous mudstones of the transition zone between the Redstone River and Coppercap Formations. Samples from the showings contain up to 11% Cu with 0.25 oz/ton Ag.

CURRENT WORK AND RESULTS

Geochemical surveys, prospecting, mapping and stratigraphic studies explored the permit and claims. Thirty-two diamond drill holes, totalling 22,438 feet, tested several copper showings on the permit.

Mapping of the claims and permit outlined areas of Redstone River Formation previously mapped by the Geological Survey of Canada as Little Dal Formation (Gabrielse *et al.*, 1973). Prospecting found copper showings in the basal Coppercap, 'Transition Zone' and in fine grained calcareous sediments associated

Figure VIII-4: Finely disseminated pyrite and chalcopyrite in micritic carbonate unit of the Redstone River Formation.

Figure VIII-5: Slabbed specimen of mineralized dolomitized micritic carbonate. Note how the minerals conform to the bedding and fenestrae infilled with chalcopyrite.

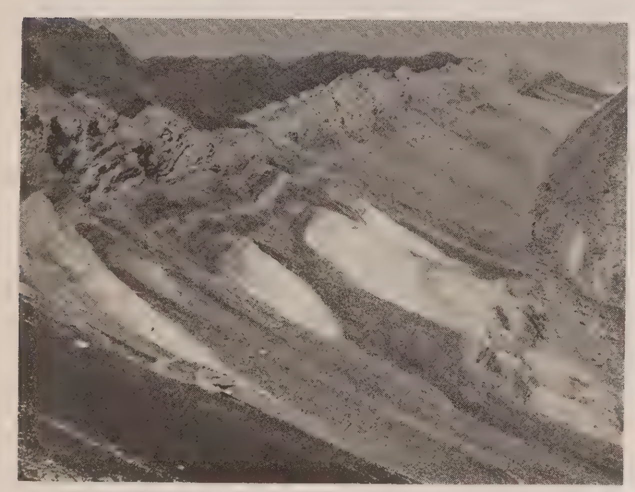


Figure VIII-6: Section of the Redstone River Formation, Mountain River, Mackenzie Mountains, N.W.T. Note thickness of evaporites and how they thin out towards the north west.

Figure VIII-7: Specimen of cryptalgal laminated micritic carbonate. Coates Lake, Mackenzie Mountains, N.W.T.

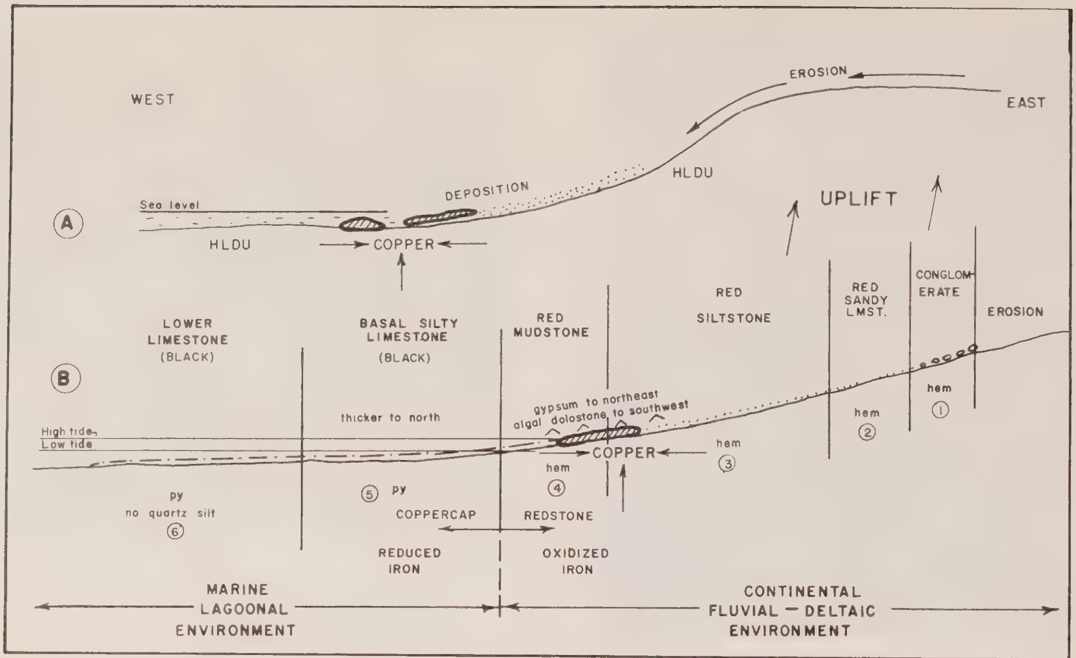


Figure VIII- 8: Redstone River Formation Depositional Model after Troup, 1976.

with fan conglomerates of the Redstone River Formation.

Interpretation of the mapping and stratigraphic studies by Shell geologists Ruelle and Bond established a facies model for the Redstone Basin by which the copper mineralization could be related to specific environments particularly its relation in time and space to the Keele, Hayhook and Coates Lake embayments of the Redstone shoreline. These environments were favourable for algal matte development and their accumulation as either extensive sheets paralleling the coast or lensoid mounds forming further off shore. It is believed these decaying algal mattes produced local reducing conditions which caused the copper to be precipitated from circulating solutions.

LEAD ZINC IN SHALES

Exploration in the Road River shales of the Selwyn Basin was virtually all done by Canex Placer on their deposits at Howard's Pass (Fig. VIII-9).

Sediments of the Selwyn Basin or trough (Blusson, 1976) consist of carbonaceous calcarenite, shaly limestone and minor argillaceous calcarenite and grey, green and black ribboned chert and varigated shale of presumably deep water origin. The geology of the area around Howard's Pass was mapped in 1977 by S.P. Gordey (1978).

Canex Placer's deposit at Howard's Pass is in black shale-mudstones of the Road River shale about 200 feet above the contact with Cambro-Ordovician 'wavy-banded' limestone. The shale-mudstone occupies relatively shallow spoon shaped sub-basins developed on the platform to basin slope. A syngenetic to early diagenetic origin for the mineralization is postulated for these deposits.

The lead zinc deposits in the Swim-Vangorda belt on the western side of the Selwyn Basin in rocks of similar lithologies are of probably the same age, i.e. Ordovician-Silurian, and depositional environment.

NOR CLAIMS — Lead, zinc
Serem Limited, — 105 I/6
770-2100, Drummond St., — 62°23'N, 129°06'W
Montreal, Quebec.

REFERENCES
Green *et al.* (1968)

PROPERTY
NOR 76-113

LOCATION
The NOR claims are 13 km (8 miles) east-northeast of Summit Lake and 6 km (4 miles) southeast of Howard's Pass (Fig. VIII-9).

HISTORY
Grandora Explorations Ltd. staked the claims in 1973 and optioned them to Serem Ltd. in 1976.

DESCRIPTION
Upper Cambrian to Devonian-Mississippian rocks underlie the claims. The Cambrian wavy banded limestone is overlain by black clastics of the Road River Formation which include fine grained shales and mudstones deposited slowly under euxinic conditions. These rocks contrast to the overlying Besa River rocks which include chert pebble conglomerates, coarse grained shales and sandstones indicating rapid accumulation notably by turbidity action.

Locally these rocks enclose massive barite layers and barite rich shales. Minor lead and zinc have been found in these barite rich shales and lenses over a strike length of 1.3 km and across 12 m widths.

Black graptolitic mudstones of the Road River Formation are also anomalously high in lead and zinc.

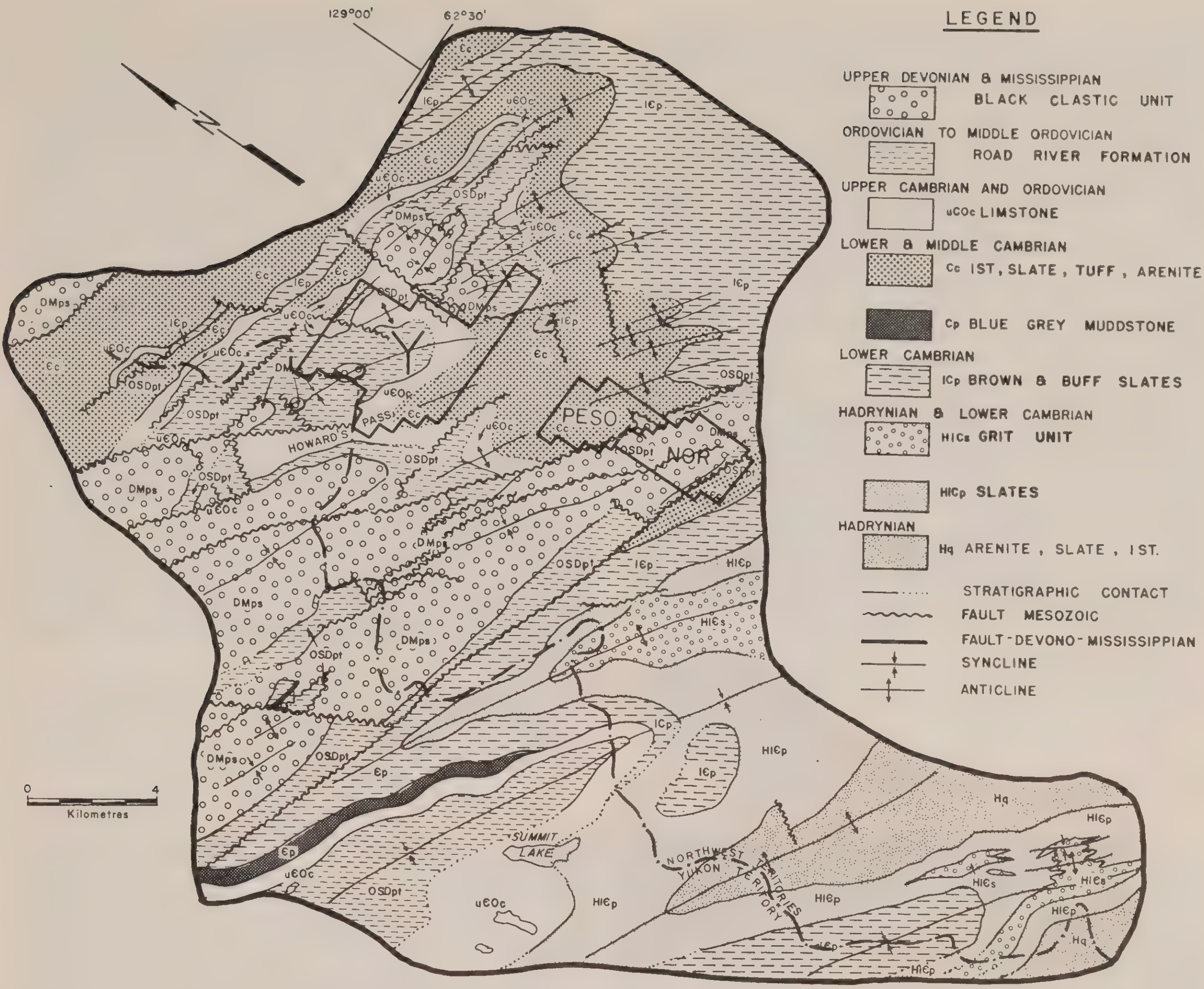


Figure VIII-9: Regional Geology of Howard's Pass after Gordey, 1978.

CURRENT WORK AND RESULTS

The claims were gridded, mapped and prospected. Lead zinc showings found in the barite rich sections of the Besa River Formation were trenched and samples assayed for lead, zinc and silver.

PESO CLAIMS
Highland Mercury Mines,
1199, West Hastings St.,
Vancouver, B.C.

Lead, zinc
105 I/6
62°29'N, 129°09'W

REFERENCE

Green *et al.* (1968)

PROPERTY

PESO 1-40

LOCATION

PESO 1-40 are 6 km (4 miles) southeast of Howard's Pass and 15 km (9 miles) east-northeast of Summit Lake (Fig. VIII-9).

HISTORY

A geochemical survey was done on the claims in 1973. Highland Mercury Mines amalgamated in 1977 with Highland-Crow Resources.

DESCRIPTION

Cambrian carbonates and clastics and shales and mudstones of the Road River Formation underlie the claims. The overlying Besa River Shales outcrop near the southern boundary of the property.

CURRENT WORK AND RESULTS

Geochemical anomalies outlined in 1973 by Tor West Resources Ltd. were tested by detailed geochemical surveys, mapping and prospecting. Several minor occurrences of lead-zinc were found.

Y CLAIMS
Placer Development Ltd.,
700, 1030 West Georgia St.,
Vancouver, B.C.

Lead, zinc
106 I/6
62°28'N, 129°10'W

REFERENCES

Green *et al.* (1968); Padgham *et al.* (1976).

PROPERTY
Y 6-24, 27-30, 35-50, 60, 62-79, 88-113 and 122-162.

LOCATION AND ACCESS
The 125 Y claims straddle the N.W.T.-Yukon border 201 km (125 miles) north of Watson Lake. A 40-mile long winter road built in 1972-73 from near the end of the Tungsten Highway to Howard's Pass is passable only to tracked vehicles, but is being replaced in 1977 by an all-weather road (Fig. VIII-9).

HISTORY
The Y claims were staked during the summer of 1972 to cover a large geochemical anomaly outlined by Placer's regional exploration. In April, 1975 U.S. Steel began to contribute exploration funds with Placer continuing as manager.

DESCRIPTION
Howard's Pass lies within the Selwyn Mountains which consist of a sequence of northwesterly striking Proterozoic and Paleozoic sediments intruded by Cretaceous quartz monzonite and granitic stocks. The sediments have been folded about northwesterly trending axes into a series of anticlines and syncline that have been cut by northwesterly- and northeasterly-striking thrust faults (Fig. VIII-10).

The main mineralized zone is on the southwesterly-facing slope of a rounded, northwesterly-trending overburden-covered ridge. Trenches bulldozed across the face of the hill have exposed deeply-weathered black graptolitic 'shale'. Such trench exposures are not reliable sources of structural information because of the varying effects of soil creep and solifluction on the hill side. As a result of deep weathering, the mineralized areas are marked only by a faint rusty gossan or locally by small amounts of secondary mineralization such as hydrozincite or smithsonite-cerussite.

Figure VIII-10: Diamond drill set up on Road River shales, Howard's Pass, Mackenzie Mountains, N.W.T.

The host rock, a black graptolitic, pyritic shale is now considered to be a mudstone by company geologists. Calcareous lenses of black, coarsely recrystalized limestone within the mudstone are a few feet thick and probably less than 100 feet long. The mudstone also contains calcareous pyritic nodules as large as basketballs. The pyrite in these nodules is well banded and interlayered with mudstones which may indicate a biogenic origin. Beneath the host rock lie thin wisps or layers of mudstone less than two inches thick. Apparently the mineralized area lies in Road River shale which together with the underlying banded limestone, form part of the southwest limb of a syncline. The host rock strikes to the northwest and was thought to dip steeply to the northeast but more detailed work indicates the structure is much more complex.

CURRENT WORK AND RESULTS
Detailed mapping, stratigraphic studies and diamond drilling were done on the main deposit in preparation for mining.

CARBONATE-HOSTED ZINC-LEAD OCCURRENCES

Carbonate-hosted zinc-lead deposits were actively sought during 1976.

The main stratigraphic units explored were the Helikian Little Dal Formation around the Gayna River area; the Lower Cambrian Sekwi Formation; and the Devonian Landry and Arnica and Manetoe Formations. In the Mackenzie Mountains lead-zinc deposits range in age from Proterozoic to Devonian and although in part structurally controlled, particularly in the Lower Cambrian strata, show many features similar to those of the Mississippi Valley type deposits of the United States. That is they have simple mineralogy, low precious metal content, occur in limestone or dolostone, are deposited at shallow depth, show evidence of solution activity and appear to be related to positive structures in areas devoid of igneous rocks (Ohle, 1959). However, many deposits in the Mackenzie Mountains typically are high grade veinlets showing erratic distribution and usually low tonnage potential, suggesting that many of the deposits that have been termed Mississippi Valley type are in fact related to the tectonics produced by one or more of the orogenies that have affected these rocks.

Many of the small structurally-controlled deposits were found after and during 1972-73 in platform carbonates which show none of the diagenetic overprint typical of the Pine Point or Mississippi Valley environments. The eastern edge of the Selwyn Basin where carbonates and shales interfingered and ecological reefs were developed and around the southwestern edge of the Mackenzie Arch, particularly in the Ordovician-Silurian and Devonian rocks, may offer more potential than the supratidal cyclic carbonates of the Lower Cambrian Sekwi Formation.

CAM	Zinc, lead
Giant Yellowknife Mines Ltd.,	95 J/3, 4, 12
Commerce Court West,	62°11'N, 123°26'W
Toronto, Ontario, M5L 1B4	

REFERENCE
Douglas and Norris (1961).

Figure VIII-11: Cross-section of solution collapse breccia. CAP property. Note blocks of individual beds can be traced back to the parent bed.

Figure VIII-12: Coarse granular dolomite influx exhibiting ribbon texture. Disseminated and bands of sphalerite occur in calcite surrounding the dolomite.

Figure VIII-13: Close-up of disseminated and bands of sphalerite in calcite and granular dolomite.

Figure VIII-14: Solution collapse breccia infilled with calcite, and dolomite.

PROPERTY
CAM 1

LOCATION
CAM 1 claim is at Mount Camsell 116 km (72 miles) west of Fort Simpson and 10 km (6 miles) southwest of the Mackenzie River.

HISTORY
CAM 1 was staked in 1975

DESCRIPTION
Manetoe Formation dolomite and Headless Formation limestone of Middle Devonian age underlie the claim. The dolomite varies in texture from black, friable, medium grained and well bedded to grey, brecciated, vuggy coarse grained and massive. Limestone is medium grey, cryptocrystalline and well bedded.

Galena and sphalerite were found in black medium grained Manetoe Formation dolomite over width of up to 12 feet. Sparse pyrite is present.

CURRENT WORK AND RESULTS
Geological mapping at a scale of 1" to 200 ft., trenching, geochemical and geophysical surveys explored the claim.

Although soil sampling indicated several zinc anomalies, a VLF EM survey failed to find any significant conductors. An IP survey discovered weak induced polarisation anomalies that are thought to be caused by underlying coarse brecciated dolomite.

CAP CLAIMS	Zinc, lead
Cominco Ltd.,	95 M/7
2200 - 200 Granville Square,	63°16'N, 126°48'W
Vancouver, B.C.	

REFERENCES
Gabrielse *et al.* (1971).

PROPERTY
CAP 1-49

LOCATION
CAP 1-49 are 161 km (100 miles) west of Wrigley and 10 km (6 miles) west of Tsezolene Range.

HISTORY
The claims were staked in 1975.

DESCRIPTION
Unbrecciated and brecciated limestones and dolostones of the Mid-Devonian Landry Formation underlie most of the claims. Recrystallization, dolomitization and brecciation formed zones of intense alteration that caused the irregular nature of the contact between the Landry and underlying Arnica Formations.

Lead zinc is found associated with alteration zones that are up to 80 meters thick and 400 meters long and consist of completely recrystallized, dolomitized limestones, and crackle and solution breccias that are healed by several generations of dolomite (granular and sparry), calcite and a mesh of fine quartz needles set in a matrix of pyrobitumin, sphalerite and galena.

This property has many of the features associated with a 'Mississippi Valley type' and is one of the better examples to be seen in the Mackenzie Mountains.

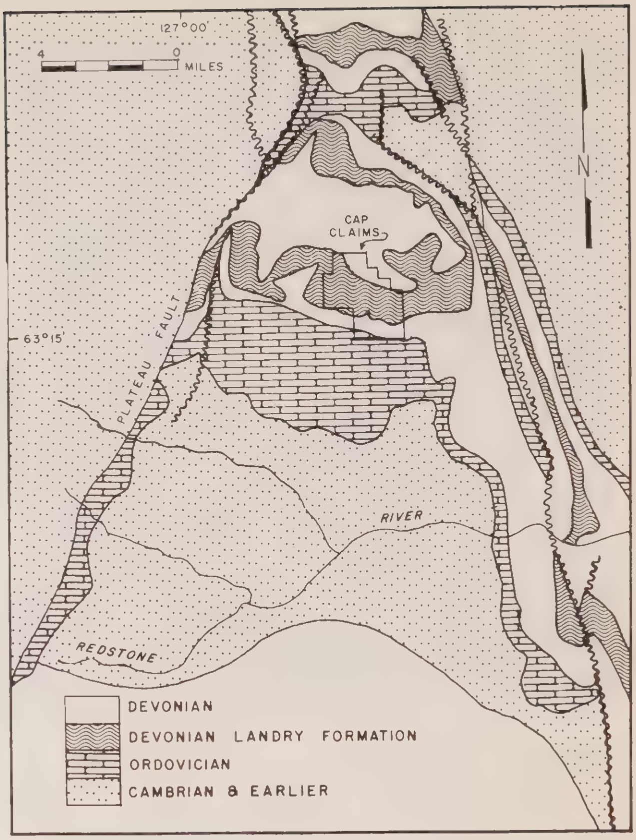


Figure VIII-15: Regional Geology of CAP Claims after Gabrielse, 1973.

CURRENT WORK AND RESULTS
Mineralized solution breccias found by prospecting and geological mapping at a scale of 1 to 10,000 were explored by trenching and geochemical surveys and tested by thirteen diamond drill holes totalling 373.67 meters.

HORSESHOE CLAIMS	Zinc, lead, barite
St. Joseph Explorations Ltd.,	105 P/6
90, Eglinton Ave.,	63°29'N, 129°13'W
Toronto, Ontario.	

REFERENCES
Blusson (1971)

PROPERTY
HORSESHOE 1-13

LOCATION
The claims are about 2 kilometers south of mile 198 of the Canol Road.

HISTORY
HORSESHOE 1-13 were staked in 1973 by Welcome North Mines Ltd. who explored the claims by geological mapping, prospecting, trenching and sampling, in 1976 they were optioned by St. Joseph Explorations Ltd.

DESCRIPTION
The country rocks are Lower Cambrian Sekwi Formation and Middle Cambrian and later calcareous

shales (units 14 and 16, Blusson, 1971). About 3,000 feet of Sekwi Formation exposed on the claims consists of a sequence of orange weathered dolomite, orthoquartzites, buff to rusty weathered dolostones and limestones interbedded with red and green shales.

The base of the Sekwi Formation is in fault contact with shales of Unit 16 (Blusson, 1971).

Lead-zinc is found in widespread float and in outcrop, filling fracture systems in dolostones of the upper part of the Sekwi Formation.

Minerals identified are smithsonite, hydrozincite, sphalerite, anglesite, cerussite, galena and barite.

CURRENT WORK AND RESULTS
Geological mapping at a scale of 1 to 5,000, soil sampling and hand trenching explored the claims.

TEE CLAIMS	Zinc, lead
St. Joseph Explorations Ltd.,	105 P/14
90, Eglinton Ave. W.,	63°47'N, 129°19'W
Toronto, Ontario.	

REFERENCES
Blusson (1971); (MIR 74).

PROPERTY
TEE 1-77

LOCATION
TEE 1-77 are 201 km (125 miles) southwesterly of Norman Wells and 27 km (17 miles) westerly of Godlin Lakes.

HISTORY
The claims were staked in 1973 by Welcome North Mines who, with geologists from Bethlehem Copper Corporation Ltd., did geological mapping, prospecting and geochemical surveys. St. Joseph Explorations Ltd. optioned the property in 1976.

DESCRIPTION
Grey orthoquartzites and brown sandstones, Units 12 and 13 (Blusson, 1971), underlie the southwestern part of the claims. To the northeast Unit 14 Sekwi Formation dolostones, limestones, orthoquartzites and red and green shales are in fault contact with Unit 16 which comprises grey, tan and black shales and minor limestones and dolostones.

Most of the lead-zinc found was as small blebs filling porous orange weathered dolostones of the Sekwi Formation, characteristically over long strike lengths and widths up to 15 meters. Grades were less than 1% lead-zinc.

CURRENT WORK AND RESULTS
Prospecting and a geochemical survey over the area underlain by unit 16 explored the claims. No significant soil anomalies were found.

TET - RAP CLAIMS	Lead and zinc, copper, silver
Canico,	106 A/1
Box 44, 1st Canadian Place,	64°02'N, 128°15'W
Toronto, Ontario.	

REFERENCES
Blusson (1974); Gibbins *et al.* (1977).

PROPERTY
39 TET claims; 42 RAP claims.

LOCATION
The TET and RAP claims are 40 km (25 miles) northeast of Godwin Lakes near the confluence of the Godwin and Ekwi Rivers.

HISTORY
The TET claims, staked by P. Risby in 1972 for Arrow Inter-America Corporation, reverted to Risby and were transferred to Welcome North Mines who staked the RAP claims in May, 1973 to cover possible extensions of the TET mineralization. The TET-RAP was subsequently optioned to Bethlehem Copper who in 1974 prospected, trenched, geological mapped, geochemical surveyed and drilled the claims (Padgham *et al.*, 1976).

Bethlehem Copper dropped the option on the TET-RAP claims because drilling found only minor tetrahedrite along fractures.

Canico optioned the claims in 1976.

DESCRIPTION
The central portion of the claim group is underlain by northwest striking Little Dal dolomite in fault contact with Nahanni and Headless Formation limestone and dolomite. These beds dip from 18° to 70° to the southwest and trend parallel to northwest striking thrust faults. They are in contact with Katherine Formation orthoquartzite to the northeast and with Lower Rapitan mudstone to the southwest.

CURRENT WORK AND RESULTS
Canico mapped the claims and diamond drilled in two holes, totalling 640 feet, which tested an IP anomaly on TET 24 and 40 intersected pyrite and minor chalcopyrite.

ARC CLAIMS	Zinc, lead
Harmon Management,	106 B/12
907-675, West Hastings St.,	64°37'N, 131°45'W
Vancouver, B.C.	

REFERENCES
Blusson (1971)

PROPERTY
ARC 1-122

LOCATION
The claims are 290 km (180 miles) north of Ross River, Y.T., near the eadwaters of the Arctic Red River.

HISTORY
ARC 1-122 were staked in 1974.

DESCRIPTION
The ARC claims lie within a northwesterly trending succession of Lower Cambrian to Ordovician sediments and metasediments which are part of the northeastern edge of the Selwyn Basin.

The oldest rocks exposed are Backbone Range quartzites, siltstones and shales, overlain by dolostones, limestones and shales of the Lower Cambrian Sekwi Formation. A thick sequence of black calcareous Road River shales overlies the Sekwi Formation.

A brown weathering dark grey dolostone unit of the Sekwi Formation hosts the zinc, lead, copper and

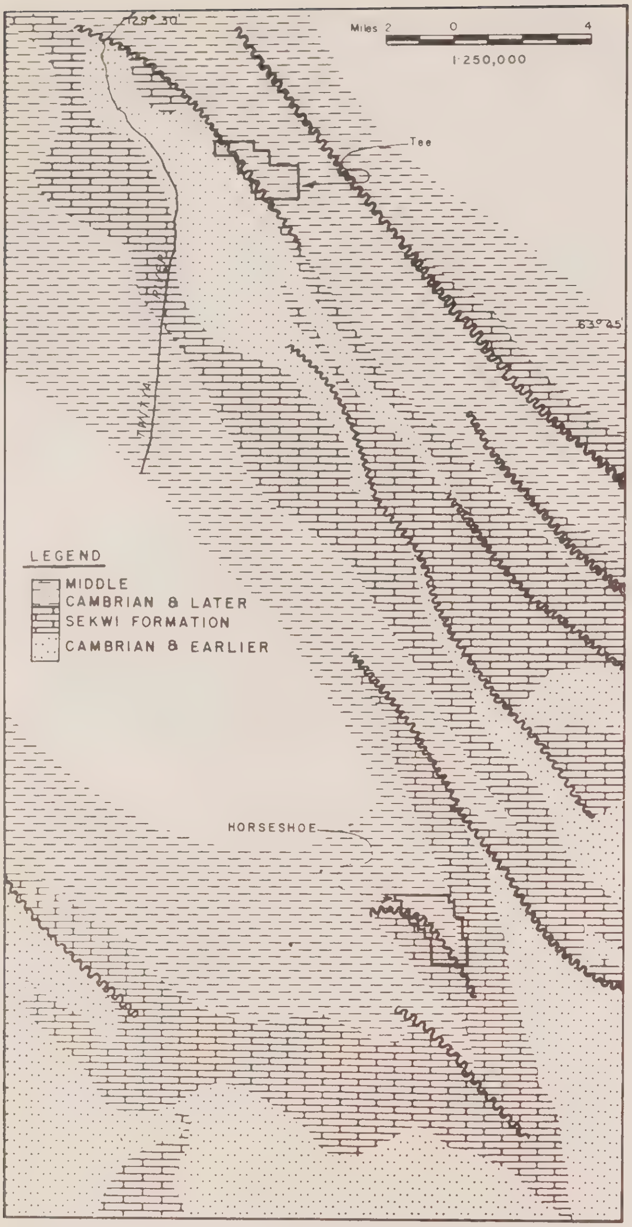


Figure VIII-16: Regional Geology of the Tee and Horseshoe Claims (after Gabrielse, 1973).

silver minerals which are found as beds, in veins, filling vugs, replacing oolites, and as fine disseminations throughout the country rock. Gangue minerals are dolomite, quartz and calcite.

CURRENT WORK AND RESULTS

Two trenches tested the width and lateral continuity of a mineralized dolostone unit, samples of which contained up to 61.6% Pb, 10.6% Zn, 0.06% Cu and 3.42 oz/ton Ag.

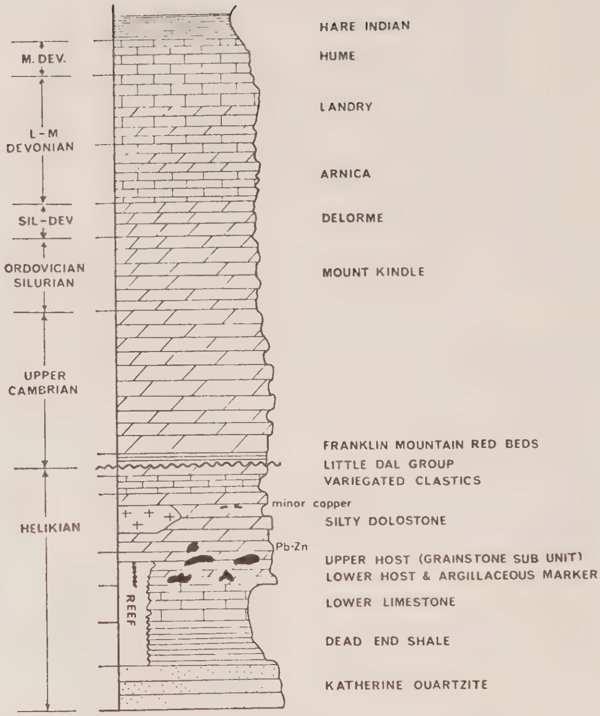


Figure VIII-17:
SIMPLIFIED STRATIGRAPHIC COLUMN
SCALE: 1" = 1500'

Gayna River
After Hewton 1976

RT CLAIMS	Zinc, lead
Rio Canex Exploration Ltd.,	106 B/15, 16
Suite 615-555 Burrard St.,	106 G/1, 2
Vancouver, B.C.	64°57'N, 130°43'W

REFERENCES

Aitken and Cook (1974); Aitken, MacQueen and Usher (1973); Aitken (1977, 1978).

PROPERTY

792 RT

LOCATION

The Rio Tinto Camp is on the Gayna River 266 km (166 miles) west of Norman Wells. A short airstrip suitable for Helio Couriers lies just east of the camp.

HISTORY

The claims were staked in 1974 by Cordilleran Engineering for Rio Tinto to cover mineralization found by prospecting and regional geochemical surveys of the H5 and Little Dal carbonates.

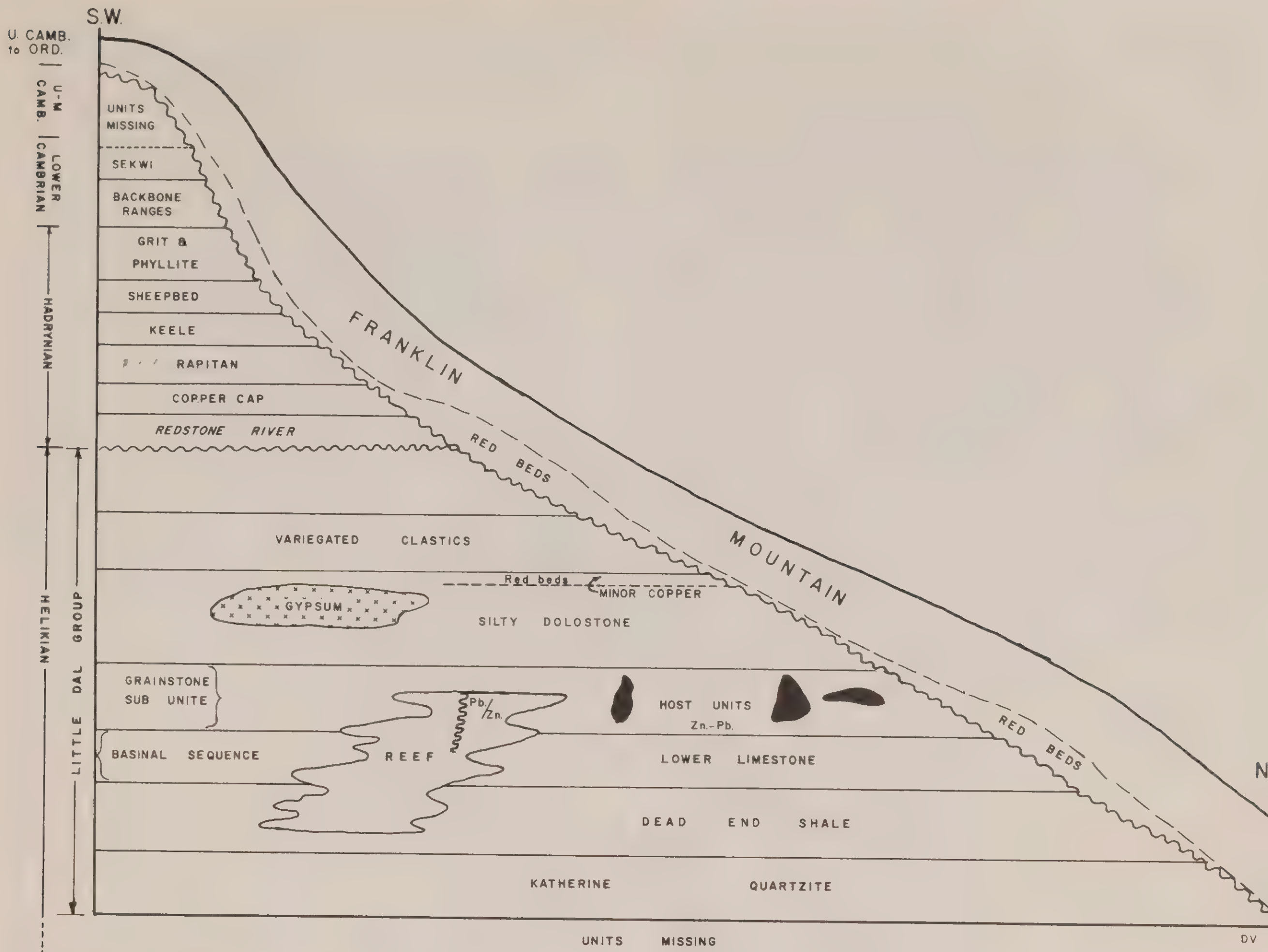


Figure VIII-18:

DIOGRAMATIC CROSS-SECTION. No. SCALE - HELIKIAN EXAGERATED.

Gayna River
After Hewton, 1976

Figure VIII-19: Solution collapse breccia infilled with dolomite and calcite.

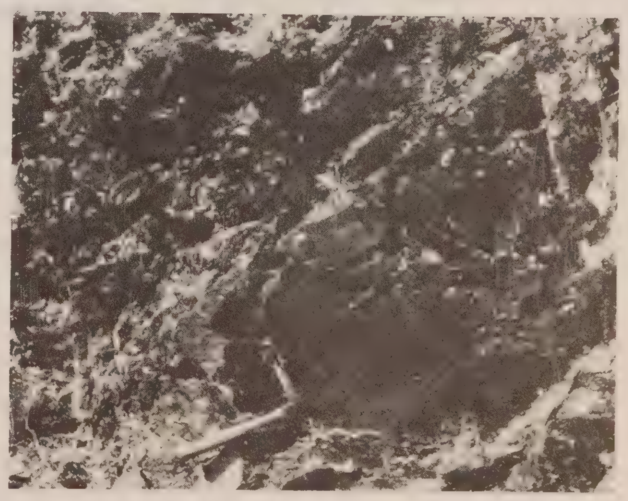


Figure VIII-20: Solution collapse breccia. Note large clasts and distribution of sphalerite.

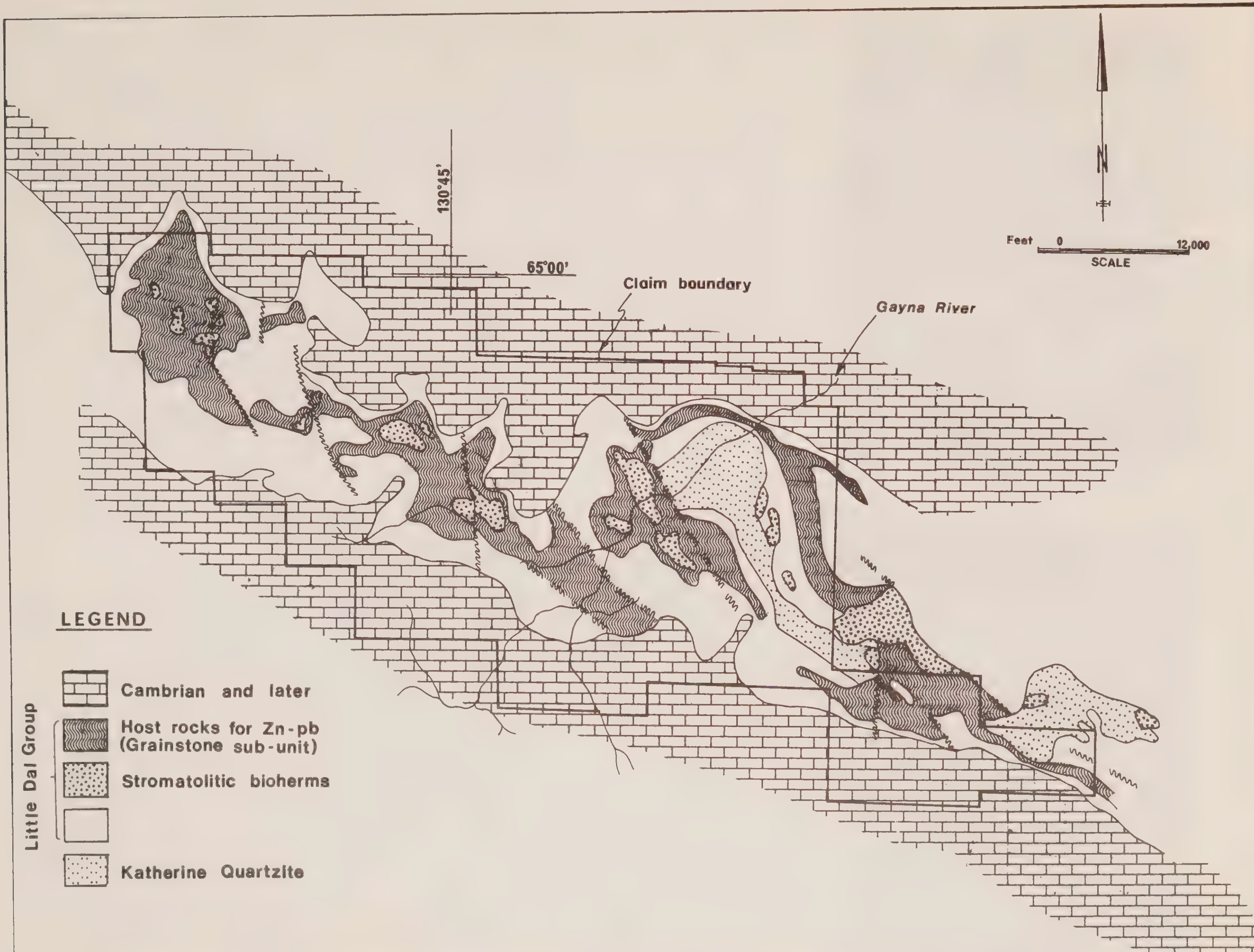


Figure VIII-21: Simplified Geology Map of the RT property (after Sanguinetti, 1975-76)

DESCRIPTION

About 12,000 feet of Upper Precambrian to Middle Devonian Strata are exposed on the RT Claims (Fig. VIII-17).

The economically important formation is the Lower Little Dal previously Helikian Map Unit H5 (Aitken, MacQueen and Usher, 1973) which is unconformably overlain by Upper Cambrian Franklin Mountain red beds.

Lower Little Dal Formation consists of a sequence of limestones, dolostones, sandstones, shales and evaporites. The 'basinal sequence' (Aitken, 1977), which consists of shales and limestones, hosts large stromatolitic algal bioherms which form a discontinuous northwesterly trending belt of reefs. The reef-cores are apparently built of a variety of cryptalgal stromatolites, and flanked by thick coarse reef-derived talus. According to Aitken (1978) the reefs, during their period of active growth, had relief of at least several tens of meters up to, possibly, one hundred meters above the floor of the basin; the stromatolites grew in large part subtidally in a low energy environment and the depositional tops of reefs where preserved are flat or stepped and have apparently developed in an agitated and probably shallow subtidal environment. The 'basinal sequence' passes into the overlying 'grainstone sub-unit' which hosts the majority of zinc-lead showings on the RT claim group and is characterized by dolomitized grainstones and sandy dolostones. A thick sequence of gypsum which conformably succeeds the grainstone sub-unit is overlain by black fissile shales.

Sphalerite in various forms and colours is associated with a variety of features similar to those that host Mississippi Valley type deposits. The majority of showings are in brecciated dolostone members of the grainstone sub-unit.

Sparsely mineralized large algal reefs are intimately associated with the sulphides which have been accumulated in primary breccias developed on the flanks of the reef and in solution collapse and crackle breccias.

The latter are the main sites of mineral deposition. The sphalerite may be pale green or orange-red and fills fractures or is present as disseminations and massive beds in structures produced either by tectonism or by karsting. Dolomite, calcite, pyrite, pyrobitumen and minor galena are associated with the sphalerite. Several periods of mineralization are indicated by brecciated fragments of sphalerite cemented by a later stage sphalerite (Hewton, 1976). The regional geological setting, style of mineralization and host structures indicated that the sulphides on the Gayna River property are Mississippi Valley type.

CURRENT WORK AND RESULTS

The claims were mapped and explored by prospecting and geochemical surveys. Because of the widespread nature of the numerous zinc-lead surface showings and to test for hidden occurrences a grid pattern was established over the Upper and Lower host (grainstone sub-unit) units and 32,206 feet were drilled in 82 holes.

BARITE

Large tonnage deposits of barite were found in 1976 during the search for stratiform barite hosted zinc-lead occurrences in the Besa River Shales around the MacMillan Pass area.

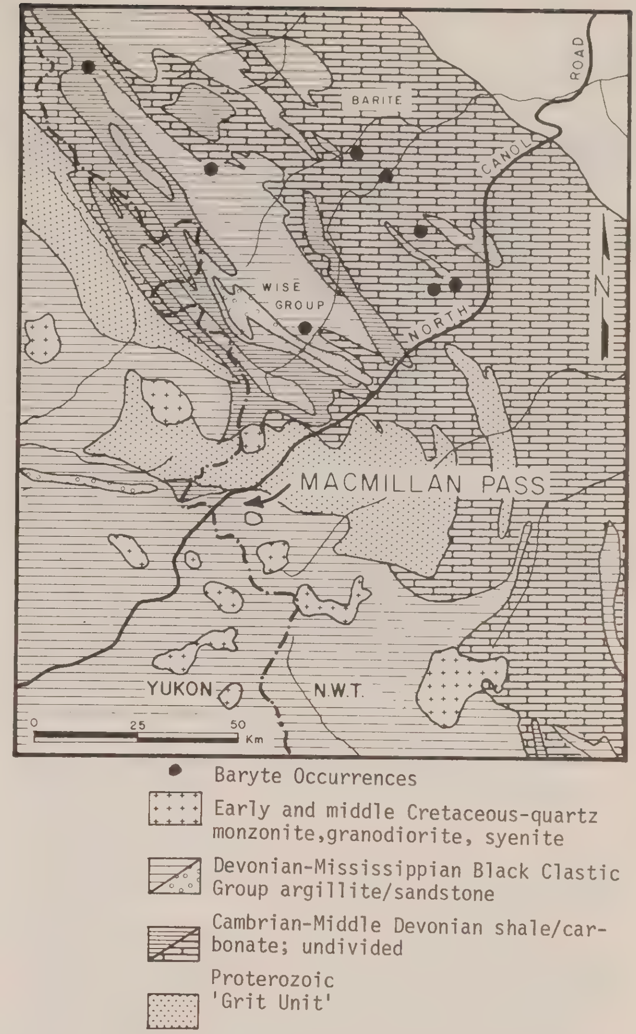


Figure VIII-22: Distribution of Barite occurrences.

The Besa River Formation or its equivalent 'black clastic' Group (Dawson, 1977) is predominantly a distinctive silver-weathering black non calcareous shale up to 2,000 feet thick. Interbedded with the shale are siltstones, limestones, pebble conglomerate and barite.

Barite beds of varying thickness constitute a broad metallogenic belt up to 160 km wide that follows the trend of Devono-Mississippian shales 300 km south-eastward to Coal River map area (95 D) and 400 km north-eastward to the Richardson Mountains (Dawson, ibid.). Only in eastern Selwyn Basin around the MacMillan Pass area has the barite been found in thick bedded sequences. The BA and WISE group cover some of the thicker sections.

Apparently during late Devonian time the MacMillan Pass region was part of an eugeosyncline that existed between the Mackenzie Arch and Selwyn Basin. The centre of the basin was infilled by fine grained clastics and was evidently shallow and had restricted circulation as the shales have a high

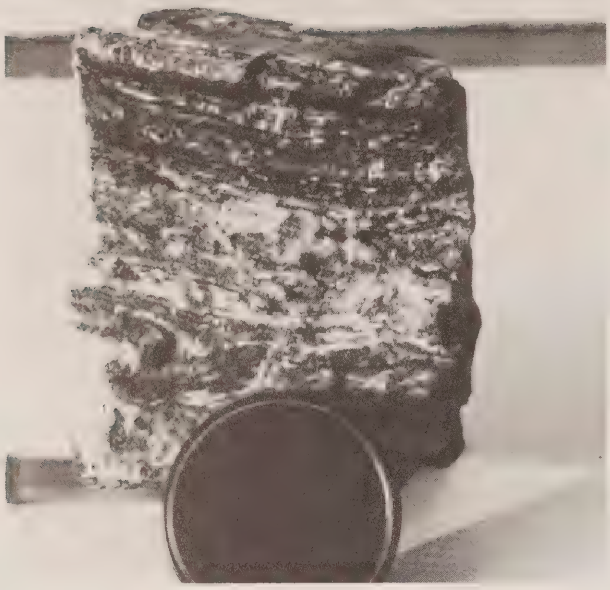


Figure VIII-23: Specimen of barite rich limestone. Barite occurs as fine layers varying in colour from white to dark grey. Wise property, Mackenzie Mountains, N.W.T.

organic and pyrite content. Conglomerates, siltstones and some limestone were deposited around the basin margins.

The tectonics of the MacMillan Pass area suggest that many of the barite and associated base metal occurrences are related to a hinge zone (Lord, 1978) that probably affected sedimentation and the loci of many types of mineral deposits since Cambrian times. This zone of weakness could have acted as a conduit for emanations of different chemical compositions, the barite accumulating in the slightly higher more oxygenated areas of sub-basins formed by tectonic disturbance during infilling of the Selwyn Basin.

BA CLAIMS	Barite
Welcome North Mines Ltd.,	105 P/10
8, 1101 Melville St.,	63°44'N, 128°47'W
Vancouver, B.C.	

REFERENCE
Blusson (1971).

PROPERTY
BA 1-15

LOCATION
BA 1-15 are 10 km (6 miles) southwest of Godlin Lakes and 6 km (4 miles) west of the Canol Road.

HISTORY
The claims were staked in 1976.

DESCRIPTION
Mid-Devonian Landry Formation limestone, barite and carbonaceous shale underlie the claims.

The barite forms thin bedded fissile units containing rounded pyrite nodules averaging 1 cm in diameter and oval nodules up to 3 mm in diameter set in a black shaley matrix. This barytic stratigraphic horizon is up to 50 feet thick and outcrops over a strike length of 2,000 feet.

CURRENT WORK AND RESULTS
Geological mapping at a scale of 1 inch to 500 feet was done and the barite horizon prospected and sampled.

ANITA, JEFF, LORRAINE, NAOMI, SANDY CLAIMS	Barite
Baroid of Canada,	105 P/12
600, 608-7th St. S.W.,	63°37'N, 129°40'W
Calgary, Alberta.	

REFERENCES
Blusson (1971)

PROPERTY
ANITA 1-3; JEFF, LORRAINE, NAOMI, SANDY (WISE GROUP).

LOCATION
The claims are in the Backbone Ranges of the Selwyn Mountains about 29 km (18 miles) north of the Canol Road and 52 km (32 miles) northeast from MacMillan Pass. The WISE Group is one mile southeast of ANITA 1-3.

HISTORY
Staked in 1975 by prospector L.M. Tyrala, the claims were later transferred to Baroid of Canada.

DESCRIPTION
The MacMillan Pass region is predominantly underlain by Upper Devonian Besa River Formation which is described by Blusson (1971) as a "shale, argillite, dark grey to black and brown siltstone with minor chert-pebble conglomerate, quartzite and minor chert".

Both claim groups are underlain by about 1,000 feet of the silvery weathering black shale unit which contains a barytic horizon near its contact with overlying siltstones.

The barite has formed as discreet radiating spheres 1 to 5 mm in diameter and as elongate lenses 2 to 5 mm by 30 to 40 mm composed of an aggregate of radially crystalline barite.

Baroid's geologists consider that the mode of occurrence and nature of the crystallization indicates a syngenetic origin for the barite. The equidirectional growth of the barite spheres suggests the barite crystallized contemporaneous with or slightly after deposition of the shale. None of the barite is laminar and the spheres show a definite arrangement indicating intermittent periods of barium sulphate influx or precipitation.

The barite bed on the WISE Group has a true thickness ranging from 83 feet to 91 feet and is exposed for a strike length of 650 feet. This bed thins to the northwest as on the ANITA #1, it is about 28 feet thick and exposed for 700 feet along strike and on claim #2, is about 32 feet thick and 200 feet long.

CURRENT WORK AND RESULTS
All claims were geologically mapped at a scale of 1 inch to 300 feet and the barite horizon trenched and sampled.

SURFICIAL GEOLOGY, PERMAFROST AND RELATED ENGINEERING PROBLEMS, YELLOWKNIFE, N.W.T.

L.B. Aspler

D.I.A.N.D., Geology Office, Yellowknife

ABSTRACT

During most of the last advance of the Laurentide ice sheet, Yellowknife was in an erosional regime; the ice produced a terrain of areal scour with ubiquitous erosional landforms and rare tills. Local sequences in which tills rest on glaciofluvial material are interpreted as the result of basal meltout contemporaneous with deposition by streams flowing through subglacial cavities. Erratics perched on bedrock surfaces may represent the lag of a till winnowed by wave action during the rise and fall of Glacial Lake McConnell.

Following deglaciation (10,000-8,000 BP) and prior to inundation by Glacial Lake McConnell, the area was subareally exposed and sands and gravels were deposited in some of the deeper valleys. One major braided stream system followed a course southwest through the valley northwest of the Ski Hill, along what is now Stock Lake, through the Yellowknife Cemetary, then northwest through the presently operated gravel pit and on to the area of the sand pit. With the rise of Glacial Lake McConnell, the south and southeastern portions of the city were flooded and silts and clays were deposited on topographic lows but sands were deposited on topographic highs. Ice rafting and/or colluviation resulted in large boulders being incorporated into the sediments. Eventually the lake swept over the entire area of the future city, to a level that is now 275 m ASL. With the fall of the lake, previously deposited silts and clays, and tills that had survived erosion during the rising stage, were eroded and coarser grained sediments were again deposited.

Permafrost is widespread in those parts of the city dominated by silts and clays, sporadic in the downtown sands and gravels, absent in the sands and gravels around the airport and absent where bedrock is exposed. With few exceptions, the permanently frozen silts and clays contain ice lenses and are thaw unstable. The permanently frozen sands and gravels are thaw stable; where visible ice is present, it serves as a pore filling cement. The permafrost table in silts and clays is 0.4 to 2.3 m deep, in sands and gravels it is 1.8 to 10 m deep. In most cases development has not resulted in total degeneration of permafrost, but rather a lowering of the permafrost table. An analysis of peat thickness, sediment type and presence or absence of permafrost indicates that peat cover is the dominant factor controlling permafrost distribution and that sediment type is an indirect influence because grain size is one of the factors controlling peat distribution. Thermal regime considerations suggest that the maximum recorded permafrost thickness of 85 m (at the Giant Yellowknife Mine) is not in equilibrium with present surface ground temperatures.

Permafrost in Yellowknife postdates the withdrawal of Glacial Lake McConnell and the lowering of water levels in ancestral Great Slave Lake. It may have started to form as isolated pockets confined to peatlands during the Hypsithermal interval, or entirely in the following cold period, as recent as 4,000 BP. It is likely that the permafrost has undergone a complex history of growth and decay as a result of climatic fluctuations in the last 4,000 years.

Engineering problems encountered in Yellowknife include those resulting from thermal subsidence due to degenerating permafrost, differential frost heave, improper seating of piles on steeply sloping bedrock surfaces, large boulders being mistaken for bedrock and the sporadic distribution of permafrost in the downtown area. Individual builders are encouraged to have thorough geotechnical site investigations carried out.

INTRODUCTION

The enclosed facies and permafrost distribution maps (Fig. IX-1) were compiled from data collected at excavations and from data harvested from the logs of over 1,000 holes drilled by various private and government agencies (see Acknowledgements) in the course of geotechnical evaluations of building sites. Many of the downtown holes were drilled in the summers of 1945 and 1946, prior to the expansion of the city from what is now Old Town (Fig. IX-2).

The facies map was constructed in the manner outlined by Krumbein and Sloss (1963), using a modified version of Folk's (1954) textural classification scheme. A facies map was selected to portray the distribution of the sediments in that, in addition to representing areal variations, such maps depict variations in the third dimension. At any given point, the sediment class is determined by an averaging of what is in the vertical section. For example, a position where 10 m of sand overlies 5 m of silt and/or clay would be plotted on the 2:1 sand:mud contour. Inasmuch as the various geotechnical studies used different classification schemes to describe the sediments, the sand:mud contours define zones of mixing broader than ideally desireable, but were selected in order to avoid building artefacts into the map and give a false degree of resolution.

GLACIAL GEOLOGY

Yellowknife is in the Bear-Slave Upland physiographic subdivision of the Canadian Shield (Bostock 1964, 1970a, b). This upland is an erosional surface repeatedly buried and exhumed since the Archean. On a regional scale the Upland is a broad, gently sloping peneplain. In detail, such as at Yellowknife, the topography is rugged: steep-sided outcrops rise to 45 m above base level and numerous structurally controlled, glacial rock basin lakes dot the terrain.

Although Yellowknife was undoubtedly inundated during earlier glacial episodes, it is the Laurentide ice sheet of the Late or Classical Wisconsin Glaciation, which climaxed at around 20,000 BP (Prest

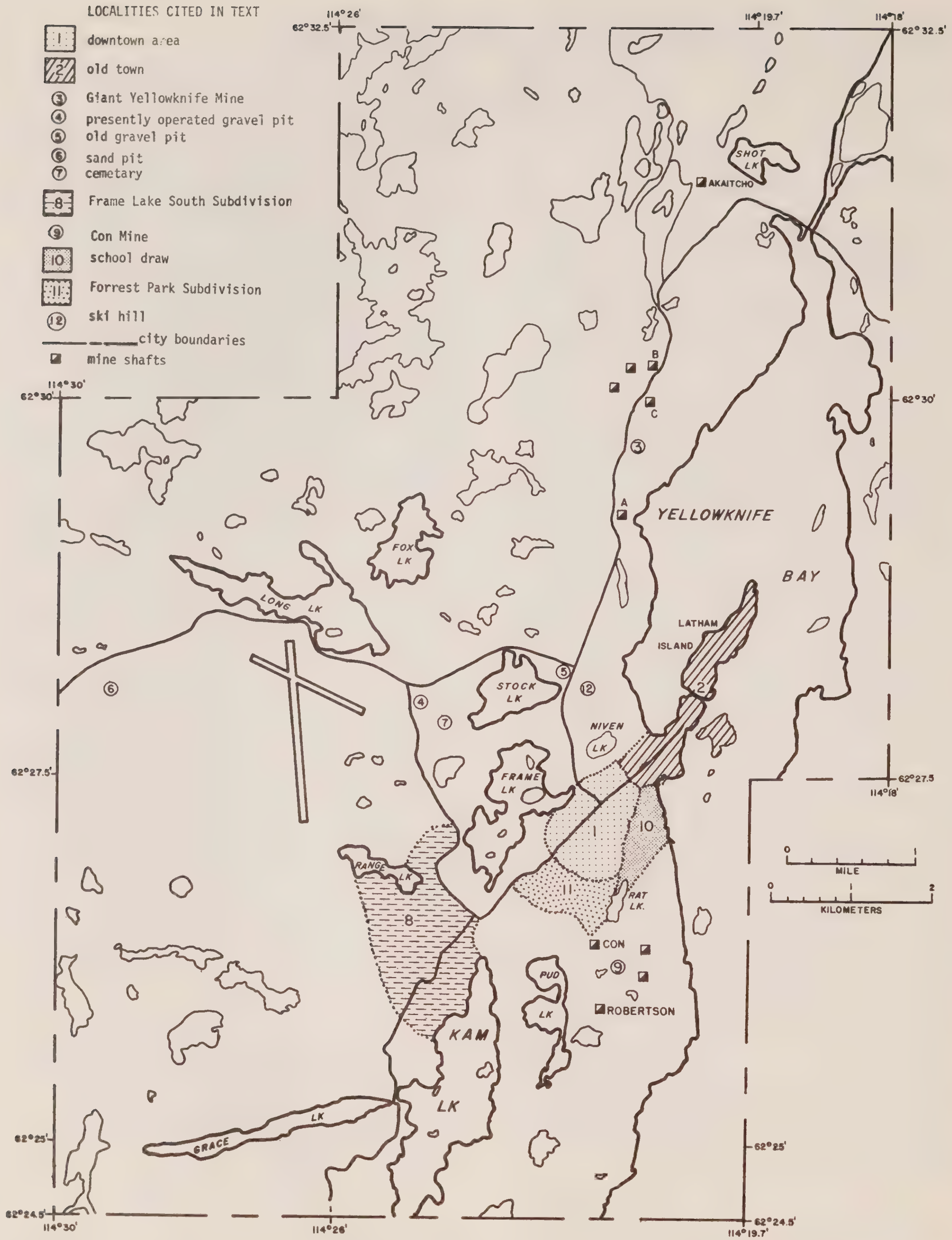


Figure IX-2 Index map of the City of Yellowknife showing subdivisions and other areas cited in the text.

1970, p. 678), whose signature remains inscribed on the landscape. Yellowknife became ice free as early as 10,000 B.P. or as late as 8,000 B.P. (Prest, 1969, Bryson *et al.*, 1969); times based on radiocarbon dates which are so few and far between that a precise refinement is not possible.

Following deglaciation, the basins of Great Bear Lake, Great Slave Lake and Lake Athabasca coalesced to form one vast proglacial lake; Glacial Lake McConnell (Craig, 1965, Cameron, 1922). As will be demonstrated in following sections, part, if not all, of Yellowknife experienced a time of subareal exposure immediately following deglaciation and prior to flooding by Glacial Lake McConnell. Craig (1965) attributes the development of the lake to differential isostatic depression to the east (produced by eastward ice thickening) which resulted in a reversal of the normal westward drainage. Strand line features east of Buffalo Lake, about 200 km due south of Yellowknife, indicate that at its maximum, Glacial Lake McConnell reached what is presently the 280 m level (Craig, 1965). Subsequent differential isostatic recovery resulted in westward tilting of the basin, first interpreted by Bell (1900, p. 109) to be responsible for the westward decrease in elevation of strandlines on the shores of Great Slave Lake. With a diminishing meltwater supply and isostatic readjustment establishing westward drainage, water levels in Glacial Lake McConnell dropped; eventually falling below the divides that separate Great Bear Lake from Great Slave Lake (about 230 m) and Great Slave Lake from Lake Athabasca (about 215 m) (Craig, 1965). Minimum dates for the lowering of ancestral Great Slave Lake to present levels are in the range 2300 - 2700 B.P. (Craig, 1970).

GLACIAL EROSION

The Yellowknife area is an example of what Sugden and John (1976, p. 194) term a landscape of areal scour; one in which signs of glacial erosion are ubiquitous. There are excellent roches moutonnees, or stoss and lee forms (terminology of Flint, 1971, p.97), assymetric valleys, rock basin lakes, striae, grooves, friction marks and polished surfaces. Flow indicators demonstrate that the ice moved to the southwest. Many valleys and stoss and lee forms follow structural trends which are at angles to the flow direction and are the result of glacial exploitation of zones of weakness provided by faults and joints.

Boulton (1972), Sugden and John (1976) and Sugden (1977) emphasize the importance of thermal regime in controlling the processes and intensity of erosion at the base of an ice sheet. Sugden (1977) has developed a model to establish the basal thermal regime of the Laurentide ice sheet at its maximum. For much of the history of the ice sheet, Yellowknife was probably in a zone of warm freezing, in which the latent heat of fusion released by the freezing of excess meltwater generated in a pressure melting zone up glacier, permitted basal temperatures to reach the pressure melting point. Freeze thaw processes would have been operative and would have allowed quarrying, debris entrainment and transport, in addition to abrasion. This would account for the degree to which glacial erosion has left its mark on Yellowknife and

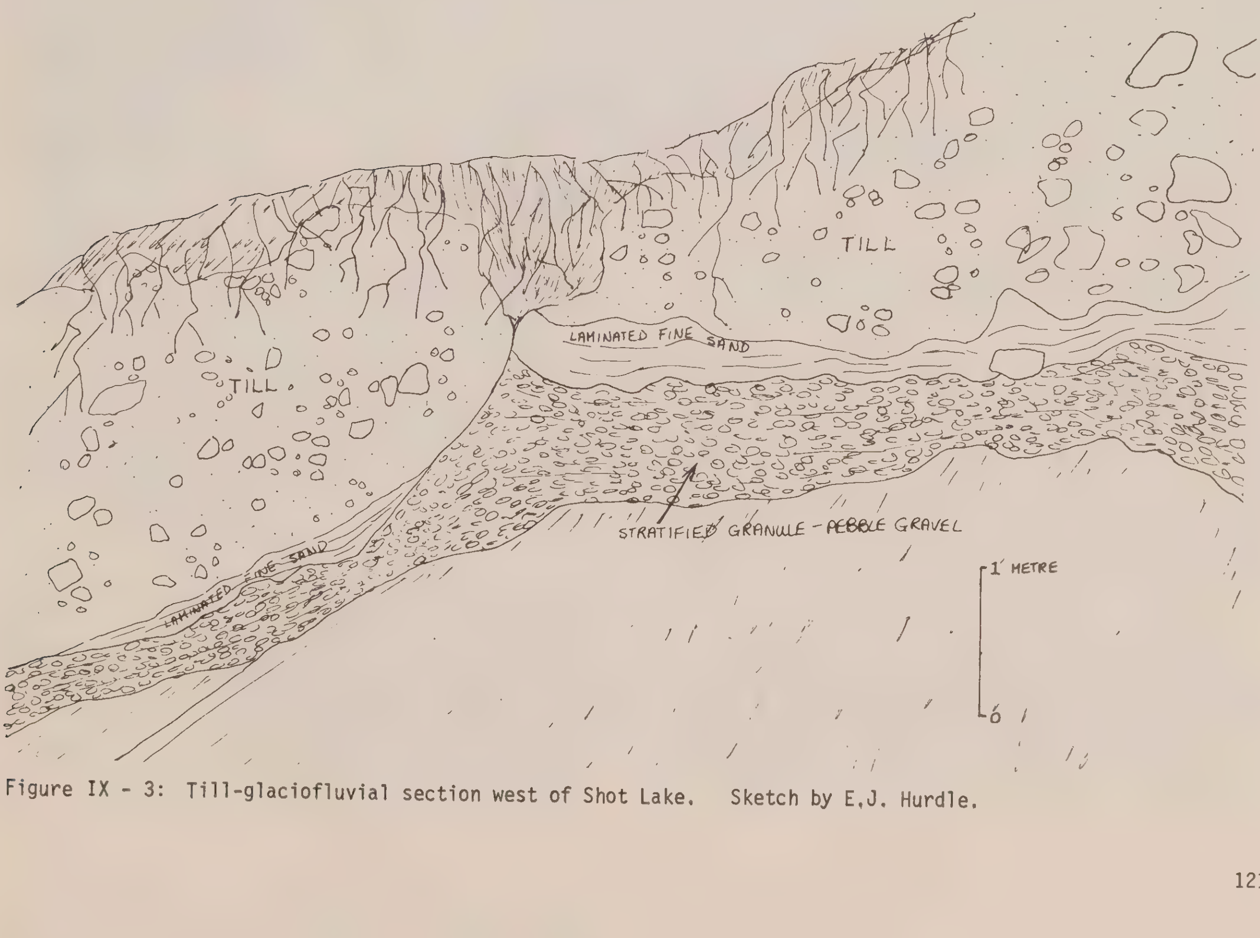


Figure IX - 3: Till-glaciofluvial section west of Shot Lake. Sketch by E.J. Hurdle.

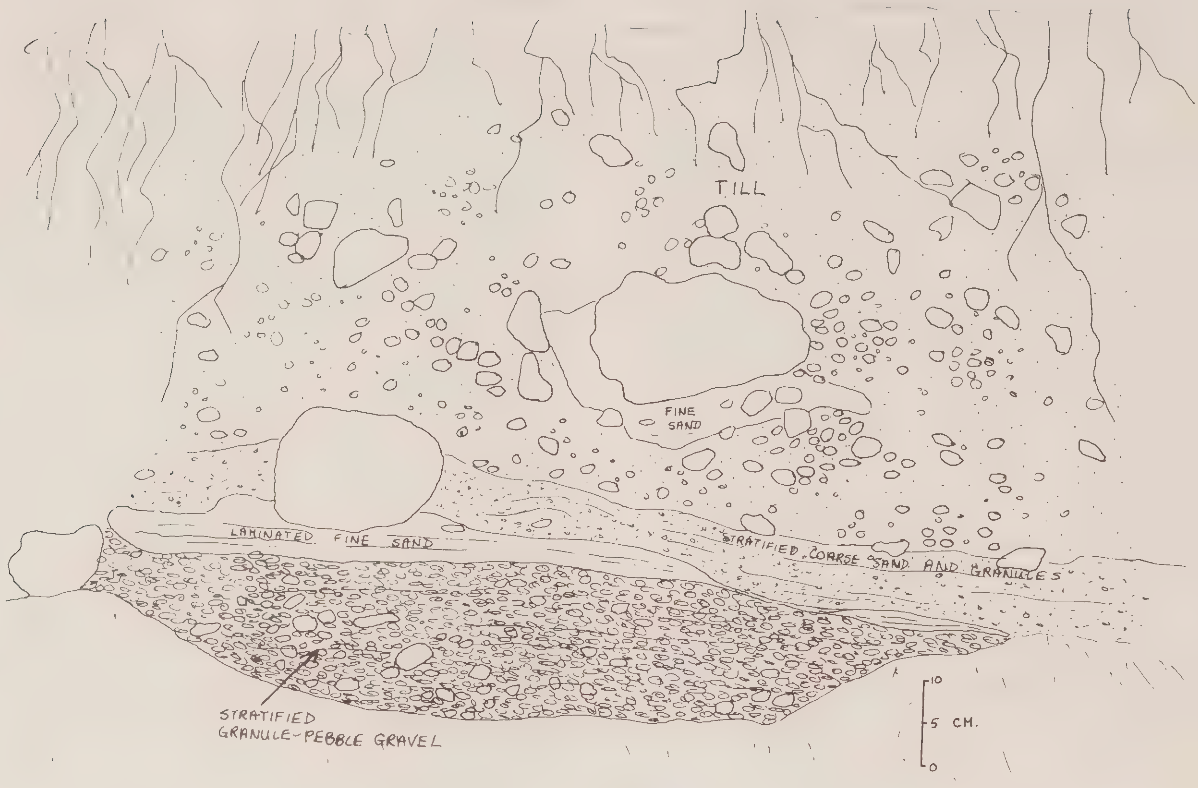


Figure IX - 4: Till-glaciofluvial section west of Shot Lake. Sketch by E.J. Hurdle.

in part, for the paucity of tills.

GLACIAL DEPOSITION

Tills are exposed at two localities along the trail which leads north from Giant Yellowknife Mines to the Crestaurum Mine (Fig. IX-2).

In a borrow pit west of Shot Lake, 1-2.5 m of till is exposed on the lee side of a large outcrop which trends normal to the ice flow direction. Angular to well rounded clasts with long axes up to 50 cm, float in a silt-clay (± sand) matrix; clast-matrix ratios range from 3:7 to 5:5. The till is apparently massive. In addition to granite, granodiorite and greenstone clasts, the till contains siltstones and carbonates, in part stromatolitic, presumably derived from exposures of the Great Slave Supergroup (Hoffman, 1968) in the east arm of Great Slave Lake.

Crudely stratified, clast supported, granule-pebble gravels, which have a coarse sand matrix, immediately underly the till and are interpreted to be glaciofluvial. A thin discontinuous layer of laminated fine sand is found locally between the till and the glaciofluvial gravels. Arcuate projections of the sand, resembling flame structures are present at the sand-till boundary (Fig. IX-3). At and above the boundary, boulders are locally nestled into 'cushions' of clean fine sand (Fig. IX-4). Also shown on Figure IX - 3 is a normal fault with a displacement of slightly less than 1 m.

Embleton and King (1975, p. 492) and Sugden and John (1976, p. 234) warn that too often in the past, the superimposition of tills on glaciofluvial materials and the presence of what are assumed to be glacio-tectonic structures, have been erroneously interpreted to represent glacial readvances. In two most readable papers, Carruthers (1947, 1948) confronted the widely held doctrine of that time, that such features represent glacial readvances, and proposed an alternate hypothesis in which the drift sequence is the product of gradual undermelting of an ice sheet; the glaciofluvial material being deposited by meltwater moving through subglacial cavities.

The critical piece of evidence in the present example is the clean 'sand cushion' beneath the boulder sitting in the middle of the till shown in Figure VIII-4. This sand suggests an intimate temporal association between the tills and the well worked fluvial material and, that the tills were not deposited by a readvancing ice sheet.

It is interpreted that a subglacial cavity developed at the base of the southwest moving ice, in

the lee of the northwest oriented bedrock protuberence (Sugden and John, 1976, p. 29, 30 list numerous documentations of such cavities), a subglacial meltwater stream occupied the cavity depositing the stratified sands and gravels and that, for the lower levels at least, basal melt-out provided for the deposition of the tills. The normal fault may have resulted from the subsequent melt-out of buried ice (eg. McDonald and Shilts, 1975) but an ice thrust origin cannot be discounted. The flame-like structures may have been the result of differential compaction of the fine sands and liquefaction (eg. Lowe, 1975), rather than from glacio-tectonism.

Tills are not exposed elsewhere in the city, but there are numerous erratics, with dimensions measuring up to several meters, perched on bedrock surfaces. These erratics may represent the lag of a till winnowed by wave action during the rise and fall of Glacial Lake McConnell. It is worth noting that isolated large boulders have been encountered (and in cases mistaken for bedrock) during preliminary site investigation drilling and during construction. Such boulders may have been derived from rafting on calved ice blocks, or alternatively, from mass wasting down the steep bedrock slopes before and during the existence of Glacial Lake McConnell.

Craig and Fyles (1960) recognize two distinct zones of glacial morphologies in the area of Arctic Canada once covered by the Laurentide ice sheet: a peripheral zone characterized by large and numerous morainal features, interpreted to represent the area of ice margin fluctuations, and a central zone in which eskers and drumlinoid features are present but large moraines are not, interpreted to represent the area where the ice sheet retreated in a more orderly fashion. That Yellowknife is in the latter zone may help to account for the restricted distribution of tills in the city. As mentioned previously, the area was probably one in which net erosion took place for most of the duration of the Laurentide ice sheet. Although conditions may have been ripe for till deposition during the later stages, when the ice margin was near the city, the retreat may have been too rapid to permit the development of a thick till sequence.

GLACIOFLUVIAL AND GLACIOLACUSTRINE DEPOSITION

Post glacial sediments in Yellowknife may be divided into three main textural facies; these are

Figure IX - 5: West wall presently operated gravel pit, view to the south, September, 1977. Gm: massive or crudely bedded pebble cobble gravel; gpGp: granule-pebble gravel with low angle planar cross stratification; gpSp: low angle planar cross stratified very coarse sands with pebbles and/or granules, Ss (Sr, Sp, St): ripple drift, planar and trough cross stratified fine-medium sand. Arrows indicate coarsening upwards sequences. Sketch by E.J. Hurdle.

gravel dominated; sand dominated and silt and clay dominated facies.

(a) *GRAVEL DOMINATED FACIES*

Superb exposures of this facies are found in the presently operated gravel pit (Figs. IX-5, 6). The sediments have been divided into six subfacies.

Gm: *massive or crudely bedded pebble-cobble gravel.*
This is the dominant facies in the gravel pit and ranges up to 6 m in thickness. The gravels are clast supported and have a very coarse sand-granule matrix. A crude bedding, the manifestation of oriented clasts, is present locally. Upper contacts are generally sharp, lower contacts are generally gradational.

gpGp: *granule-pebble gravel with low angle planar cross-stratification.*
This unit ranges from 0.5-2 m thick; single cross-stratification sets comprise the full thicknesses. The granules and pebbles are clast supported and have a very coarse sand matrix. Bedding is the manifestation of alternating pebble rich and granule rich layers, individual layers being of the same thickness as the short axes of the clasts. Forset angles are generally less than 15°. The unit has gradational upper contacts and often coarsens upward and laterally to subfacies Gm. Lower contacts are also gradational.

gpSp: *planar cross-stratified very coarse sands with isolated pebbles and/or granules or with rare pebble and/or granule concentrates.*
This unit ranges from 0.2 - 2 m thick; single cross-stratification sets comprise the full thicknesses. Forset angles are generally less than 15°. Upper contacts are generally gradational and the unit coarsens upwards and laterally into gpGp or Gm. Lower contacts are generally sharp. The above three facies are end members of a continuum, and in cases, the distinction between gpSp with abundant granules and pebbles and gpGp is arbitrary, as is the distinction between gpGp with a high pebble content and Gm.

Ss (Sr Sp St): *ripple-drift* (Sr), *planar* (Sp), *and trough cross-stratified* (St) *fine-medium sand.*
This unit is found as thin impersistent layers up to 0.6 m thick and as sand wedges up to 3 m thick. The ripple-drift cross laminated sands (Jopling and Walker, 1968, Walker, 1963, 1969) are found in sets from 1 - 6 cm thick. Cycles are present in which planar cross lamination with an imperceptible angle of climb pass upwards to Jopling and Walker's (1968) Type A ripple-drift cross lamination with no stoss preservation and with an angle of climb that increases upwards. These in turn pass into sinusoidal ripples with complete stoss preservation. Such cycles are indicative of a rapidly increasing ratio of suspended load to traction load during a waning flood (Jopling and Walker, 1968).
Trough cross laminated fine sands have individual troughs ½ - 4 cm deep and 3 - 8 cm wide. In plane view they are concave in the downcurrent direction and resemble

Figure IX - 6: West wall presently operated gravel pit, view to west, April, 1978. Gm: massive or crudely bedded pebble-cobble gravel, gpGp: granule-pebble gravel with low angle planar cross stratification, gpSp: low angle planar cross stratified very coarse sands with pebbles and/or granules, Ss (Sr, Sp, St): ripple drift, planar and trough cross stratified fine-medium sand. Arrows indicate coarsening upward sequences. Sketch by E.J. Hurdle.

the 'micro-cross lamination' or 'rib furrow' described in Potter and Pettijohn (1977, p. 96).
Planar crossbeds in medium-coarse sands with rare granule concentrates, in sets up to 30 cm thick. Forset dips may be as high as 30°.
Both upper and lower contacts of the sand facies are sharp.

CF: *channel fill.*
Channels exposed in the gravel pit range from 0.5 - 2 m deep and 6 - 12 m wide. Wall slopes may be as high as 30°. They are filled by crossbedded medium-coarse sands or granule-pebble gravels. In either case, bedding is concordant with the channel shape.

Sil: *laminated silt and very fine sand.*
This subfacies is preserved only at the upper level of the gravel pit as a 7 cm discontinuous layer between cross laminated fine sands.

Paleocurrent measurements on cross stratification indicate a flow direction in the old gravel pit (28 measurements) to the southwest and in the presently operated gravel pit (57 measurements) to the northwest.

The sediments in the gravel pit are interpreted to be the product of braided stream deposition. The absence of glaciolacustrine silts and clays suggests that the gravels and sands were not deposited as the topset or forset beds of a proglacial delta entering Glacial Lake McConnell. Southeast of the gravel pit silts do interfinger with sands and gravels, but the fact that the paleocurrents determined for the old gravel pit are to the southwest and for the presently operated gravel pit to the northwest suggests that the interfingering is the product of a gradual onlap of Glacial Lake McConnell, roughly perpendicular to the stream flow direction. The tounge of sand and gravel on the south side of the NNW trending runway may represent deltaic deposition. The absence of ice collapse structures and interbedded tills imply that, at the time of deposition, the ice margin was removed from the gravel pit site. The channel fills (CF) are not composed of massive sand, bearing soft sediment deformation structures, one of the features which Rust (1977) considers diagnostic of subaqueous outwash as defined by Rust and Romanelli (1975) for deposits near Ottawa. Finally, the lithologies, the stratigraphic relationships and the type and sequence of sedimentary structures bear strong resemblance to both examples of modern braided streams, and to ancient sequences interpreted in the literature as braided stream deposits, (eg. Williams and Rust, 1969; McDonald and Banerjee, 1971; Church, 1972; Costello and Walker, 1972; Rust, 1972, 1975; Eynon and Walker, 1974; Gustavson, 1974; Smith, 1974; Boothroyd and Ashley, 1975; Hein and Walker, 1977; and Miall, 1977).

The massive or crudely bedded pebble-cobble gravels (Gm) are interpreted as the product of the vertical aggradation of a series of diffuse gravel sheets and/or bars (possibly longitudinal), on which angle of repose slip-facies on downstream ends were prevented from developing because rates of downstream migration which were excessive in relation to rates of vertical aggradation (Hein and Walker, 1977). As Miall (1977, p. 10) points out, "successive dynamic events may build multistorey gravel units with little to mark the contact between each bar development" and it is unlikely that each Gm unit represents a single depositional event.

The granule-pebble gravel units with low angle planar cross-stratification (gpGp) and the low angle planar cross-stratified very coarse sands with granules and pebbles (gpSp) may have formed by the downstream migration of bars (possibly transverse) which were permitted to develop slip facies due to lower sediment and fluid discharge and lower rates of downstream migration relative to vertical aggradation (Hein and Walker, 1977). As shown in Figure IX-6 there is a unit of gpGp with relatively steep crossbeds dipping in a direction opposite to that of the overall trend. This unit may represent accretion on the stoss side of a bar.

The coarsening upward cycles are interpreted as the consequence of increasing fluid and sediment discharge during single flood events and/or during ones which were separate and distinct; both of which would result in the migration of coarser grained bars over previously formed finer grained bar deposits. In that the Gm subfacies is the dominant lithology, it is suspected that the gpGp and gpSp units represent lower than 'normal' floods.

The sand layers of unit Ss are interpreted to have formed during waning flood stages by the migration of ripples, dunes and sand waves (eg. Southard, 1975, p. 24) on bar surfaces, or as overbank deposits. The sand wedges probably formed by lateral accretion on bar margins during waning floods (eg. Rust, 1972, Fig. 14).

The laminated silts and fine sands (Sil) are interpreted to be overbank deposits.

Along the axes of many valleys, gravel and/or sand deposits are found resting directly on bedrock and are overlain by thick sections of silt and clay and/or sand (see cross sections B-B^1 and D-D^1). Descriptions of the gravels found in drill logs are inadequate to positively ascertain whether these are tills or represent fluvial deposition. At the Giant Mine, Bateman (1949) reports that several feet of sand and gravel are found in a similar position. During excavation of the A2 open pit, the gravels were found to have a sand matrix (M. Horne pers. comm. 1978). Although the possibility that the gravels represent tills cannot be ruled out, it is suggested here (and in Bateman, 1949) that the sands and gravels represent a period of subareal exposure and fluvial deposition following deglaciation and prior to inundation by Glacial Lake McConnell.

(b) *SAND DOMINATED FACIES*

Planar crossbedded and trough cross laminated sands are exposed in the sand pit west of the airport. Paleocurrents (97 measurements) indicate flow directions to the northwest and north-northeast. The location of the sands and the paleocurrent results suggest that there is a proximal-distal relationship between the gravels to the east and the sands; that the sands are a downstream equivalent to the gravels.

In the downtown area, undisturbed sand exposures are absent. The drill hole data show that in any given area (except for what have been previously interpreted as pre-Glacial Lake McConnell deposits) where the sands rest directly on bedrock, it is where the bedrock forms buried topographic highs (eg. cross sections B-B^1 and C-C^1). Sands are also found resting above, interfingering with, and overlain by,

glaciolacustrine silts and clays.

These relationships suggest that the sands are a shallow water facies equivalent to the glaciolacustrine silts and clays, deposited both during the rise and the fall of Glacial Lake McConnell. They may have formed by beach (as first suggested by Jolliffe, 1938, p. 2), fluvial, eolian or in part colluvial, processes or various combinations thereof.

(c) *SILT AND CLAY DOMINATED FACIES*
The silts and clays which blanket a large portion of the city are assumed to have been deposited in Glacial Lake McConnell. They are varved, with red-brown and dark grey clay laminae alternating with laminae of grey-brown and light grey clayey silt. The coarser grained part of each couplet is probably a turbidity current deposit, the finer grained portion being an interturbidity current suspension deposit (eg. Agterberg and Banerjee, 1969, Gustavson, 1975). Striated pebble dropstones and sandy lenses in this facies presumably resulted from ice rafting.

(d) *POST GLACIAL SEDIMENTATION SYNTHESIS*
Following deglaciation, Yellowknife experienced a period of subareal exposure, during which sands and gravels were deposited in watercourses following deep valleys. One major braided stream flowed in the valley northwest of the ski hill, along what is now Stock Lake, through the Yellowknife Cemetary, then northwest through the presently operated gravel pit and on towards the sand pit area. Concurrent in part with the deposition of sediments in the gravel pit (the base of which, approximately 185 m ASL, is above the lowermost deposits to the southeast) Glacial Lake McConnell began to flood the south and southeastern portions of the city, resulting in silts and clays being deposited in what were then topographic lows, sands being deposited on topographic highs, and the erosion of previously deposited tills. Ice rafting and/or colluviation resulted in the incorporation of large boulders into the sediments. Subsequently, Glacial Lake McConnell inundated the entire area rising to what is now about 275 m ASL. With the fall of Glacial Lake McConnell, previously deposited silts and clays, and tills which survived erosion during the rising stage, were eroded and coarser grained sediments were again deposited. There are sand ridges that may be old strand lines west of the gravel pit. It is likely that the valley northwest of the ski hill was cut into the braided stream sand and gravel deposits by a northeast flowing stream draining Stock Lake; the reversal in drainage resulting from the lowering of the level of the lake.

PERMAFROST

Yellowknife is in the northern part of the discontinuous permafrost zone (Brown, 1967a). Permafrost is widespread in those areas of the city dominated by silts and clays, sporadic in the sands and gravels of the downtown area, absent in the sands and gravels in the vicinity of the airport and absent where bedrock is exposed.

As all the logs examined during the present study are from holes drilled to determine soil conditions and/or depth to bedrock for engineering purposes, the only data yielding information on the maximum depths to which permafrost may extend come from Giant Yellowknife Mines. Bateman (1949, p. 10) writes that in the number 2 shaft (B shaft) area, permafrost extended throughout most of the 115 ft. (35m) level and was encountered at a depth of 280 ft. (85m) in one part of the mine.

CLIMATOLOGICAL PARAMETERS
The following climatological data, from Burns (1973, 1974) were compiled from observations taken at the Yellowknife airport weather station between 1942 and 1970.

The mean annual air temperature is 22°F (-5.6°C), the maximum monthly mean (July) is 60.8°F (16.0°C) and the minimum monthly mean (January) is -19.4°F (-28.5°C). The daily mean drops below freezing during the last week in September and rises above freezing during the third week in April. The freezing index is slightly greater than 6000°F days (3400°C days) and the thawing index is slightly greater than 3000°F days (1700°C days).

The mean annual precipitation is 9.8" (25.0 cm) of which rain accounts for 5.5" (13.9 cm) and snow 4.4" (11.1 cm) (expressed as water equivalent). The 'wet' season is from July to October with August receiving the maximum precipitation of 1.4" (3.6 cm).

The mean date of the first snow depth of at least 1" (2.5 cm) is in the third week of October. Snowcover at the flat unprotected airport site increases gradually from less than 5" (13 cm) at the end of October to a maximum of almost 20" (51 cm) at the end of February, remains constant throughout the month of March and thins dramatically to 5" (13 cm) by the end of April. The mean date of the last snow depth of at least 1" (2.5 cm) is in the first week of May.

Wind direction probability diagrams indicate that southwest winds are infrequent and that there is, more or less, an even distribution about the remaining quadrants.

GROUND TEMPERATURE AND GEOTHERMAL GRADIENTS
Results of ground temperature measurements in Yellowknife have been published by Bateman (1949), Bérubé *et al.* (1972 - 1973), Brown (1973a) and Judge (1973).

Brown (1973a) stresses that down to 15 m, mean annual ground temperatures can vary nearly 2°C between different terrain types within the same restricted area. At a perennially frozen peatland site which supports black spruce and tamarack, scattered willow and alder underbrush and a ground cover of *Sphagnum* and lichen and where 1 m of peat covers 3 m of silty sand which sits on greenstones, the mean annual ground temperature (15 m) is -0.5°C (Brown, 1973a). Measurements made in March, 1975 at the site of the new CBC building in frozen sandy clayey silts which are overlain by 2-3 m of frozen fine sands indicate ground temperatures (at about 7 m) of -0.2°C to -0.3°C (E.B.A. Engineering Consultants Ltd., 1975). An unfrozen beach ridge which supports a dense stand of birch, jackpine, alder, and willow and a ground cover of berry plants, mosses and lichen, and where 3 cm of organic material overlies sandy gravels, has a mean annual ground temperature (15 m) of 0.9°C (Brown, 1973a). An exposed granodiorite site with scattered stunted black spruce has a mean annual ground temperature (15 m) of 1.6°C; at a similar greenstone site the value is 1.1°C.

Espley (1969, p. 60) and Judge (1973, p. 58) report a geothermal gradient of 16°C km^{-1} for greenstones at the Giant Mine. From measurements in a

924 m hole drilled in granites near Baker Lake 3 km west of Giant, Judge (1973, p. 59) gives a geothermal gradient of 12°C km^{-1}. Brown (1973a, p. 28) notes thermal conductivity values (wet) for nearby greenstones at 2.72 $Wm^{-1}K^{-1}$ and granodiorites 2.60 $Wm^{-1}K^{-1}$.

PERMAFROST DISTRIBUTION

(a) *SILT AND CLAY DOMINATED AREAS*

Permafrost is widespread in those areas dominated by silts and clays. The fine grained sediments support scattered stunted locally drunken black and white spruce, willow patches and a ground cover of mosses and sedges. In the Niven Lake area, the Frame Lake South Subdivision and in the vicinity of Rat Lake, peat thicknesses average 1.1 m, 0.4 m and 1.1 m and range from 0.2 - 2.4 m, 0.1 - 1.2 m and 0.2 - 2.1 m respectively. Palsas have formed east of Rat Lake and adjacent to the small pond northeast of Stock Lake and were present, prior to development, in the Frame Lake South Subdivision.

In relatively pristine areas, the average depth to the permafrost table is about 1.5 m, ranging from 0.4 - 2.3 m. Where development has taken place over a period of years, the permafrost table may be as deep as 8.2 m. A comparison of figures derived from holes drilled in 1970 with those from holes drilled in 1976 indicates a lowering of the permafrost table southwest of Rat Lake by an average of 1.5 m.

The base of the active layer usually coincides with the permafrost table, but there is a residual thaw zone (Linell and Kaplar, 1966, p. 482; Brown and Kupsch, 1974, p. 39) between the two boundaries in 17 holes, all drilled in April, 1975. The permafrost table determined from these 17 holes corresponds with the level obtained from those drilled in December, 1977. A review of the temperature and snowfall data for the winter of 1974-75 on file at the Yellowknife weather office revealed that there was a record snowfall during the early winter; for the months of October, November and December it was 69 cm above average. Thus rather than interpreting the presence of a residual thaw zone as the result of permafrost degradation and a lowering of the permafrost table, it is suggested that the insulating effect of the heavy snowcover in the early winter inhibited heat loss and prevented the frost from penetrating to its normal level.

As might be expected, ground ice is ubiquitous in the frozen silts and clays. Reticulate ice veins (Mackay, 1974) and stratified ice lenses have been exposed in varved silts and clays at Giant Mines' Al open pit. Ice lenses 1 - 10 cm thick concordant with bedding link up with crosscutting veins 1 - 7 cm thick, imparting a brecciated appearance; with rectangular and wedge shaped sediment blocks floating in the sediment-free, dark, translucent and rarely bubbly ice matrix. The ice content is estimated to be 20-30% by volume. Mackay (1974, p. 234) explains the formation of reticulate ice veins in terms of a freezing front which propagates downward rapidly due to a steep gradient and the presence of low permeability, structureless soils which inhibit the upward movement of water necessary to maintain a horizontal, stationary freezing front. With the development of segregated ice above the freezing front water drawn from the adjacent sediment results in desiccation cracks which, when filled with ice, produce the reticulate pattern.

Stratified ice lenses up to 3 cm thick were observed in varved clays and silts at an excavation in the Frame Lake South Subdivision. The ice is dark, translucent and bubble free and constitutes up to 40% of the section by volume. The lenses have formed preferentially at silt-clay contacts. Locally there are delicate ice filled hairline fractures. The development of the ice lenses has produced local bedding deformation. In contrast to the open pit site, the temperature gradient here must have been sufficiently low and the vertical permeability sufficiently high, both of which, along with a pore water pressure gradient towards the frost line, would allow the repetitive maintenance of a stationary freezing front and the growth of the stratified ice lenses (eg. Mackay, 1971; Williams, 1967, 1968).

In the subsurface, clay units are invariably logged as having visible ice either as inclusions, stratified lenses or random veins. Frozen silt units are generally described as having visible ice. When visible ice is absent, the units are classified as being well bonded with or without excess ice (Nbe, Nbn of Pihlainen and Johnston, 1963) after thaw tests have been made. Only rarely are frozen silts described as being poorly bonded (Nf of Pihlainen and Johnston, 1963).

Ice contents are generally in the range of 5-20% by volume, but values as high as 40% are common. Rarely, over an interval of 1 to 3 m ice contents may be as high as 80%, with ice lenses as thick as 20 cm alternating with thin clay and silt layers.

Relatively soil free massive ice (Mackay, 1966, 1971; Rampton and Mackay, 1971) 2.3 m thick was encountered beneath a 2.4 m peat cover north of Niven Lake during drilling on what may have been a palsa (the site is now used by the city as a snow dump). Immediately beneath the ice lay 0.7 m of sand followed by 4.0 m of silt. Similar ice bodies up to 1 m thick and several meters long were uncovered in the excavations for service lines west and north of Rat Lake (B. Van Hees pers. comm. 1978). The ice was found in silts, at or near the contact with the overlying 1.5 m peat cover. It is the growth of segregated ground ice, not the accumulation of peat that accounts for the relief of palsas (eg. Brown, 1973b, p. 29).

In the deeper holes (>6m) where the same lithology persists for the entire depth and for which continuous measurements were recorded, there are generally no systematic variations in either the volume of ice or the size of ice lenses with depth. However, there are many examples where there is a volume decrease, and/or the size of the lenses decreases, or the lenses disappear altogether. Similarly, where random ice veins are noted, they generally persist with depth, yet there are many cases where, even though stratified lenses and inclusions continue, the random veins disappear, before the base of the hole is reached.

Where encountered, permafrost almost always extends for the full length of holes drilled to bedrock. North of Niven Lake several holes were drilled in sections not frozen to bedrock, suggesting that here the permafrost is younger than elsewhere; compared with other areas, terrain conditions were probably not suitable for the preservation of permafrost formed during an earlier period nor for the aggradation of permafrost until a later time.

(b) *SANDS AND GRAVELS AND MIXED MUDS AND SANDS OF THE MAIN PART OF THE CITY*

In the sands and gravels and mixed muds and sands of the main part of the city, there are only few isolated pockets of permafrost.

Prior to development, the downtown area supported scattered black and white spruce, jackpine, birch and poplar. The logs of the 1945-1946 drilling indicate that parts were mantled by a muskeg cover which averaged 0.3 m. The permafrost table ranged from 0.3 - 3.4 m with an average of 1.4 m.

In most cases where the 1945-1946 and the more recent date can be compared, total degradation of permafrost is not indicated but rather a lowering of the permafrost table, locally by as much as 10 m. Nowhere was evidence of permafrost aggradation recognized.

The present permafrost table ranges anywhere from 1.8 to 10 m. The depth of seasonal frost penetration is from 2 - 4 m. Thus a residual thaw zone between the level of frost penetration and the permafrost table is recorded in many logs.

Near the surface, the frozen sands and gravels commonly contain visible ice in the form of a pore filling cement; with depth, the visible ice tends to disappear. Excess ice in sands was noted in only one example, over an interval of 1 m immediately above bedrock in a 7 m hole drilled entirely in sand. When silt and/or clay pockets are found within sands, they commonly contain ice lenses.

Mackay (eg. 1971b, p. 28) writes that when permafrost aggrades in a closed groundwater system and fine grained sediments are either interbedded with or underlain by coarse grained sediments, conditions are ideal for the growth of massive ice bodies. That the stratigraphic criterion is met, yet massive ice bodies are not present, suggests that permafrost aggradation in Yellowknife took place under an open groundwater system where the subpermafrost groundwater was linked to existing surface bodies of water. That is, when the pore water in the sands and gravels froze, "... the 10% volume expansion associated with freezing [would have been] accommodated for by the expulsion of about 10% of the pore fluid", ultimately into the surface bodies of water (Mackay 1972, p. 237; 1971a).

(c) *SANDS AND GRAVELS IN THE VICINITY OF THE AIRPORT*

Around the airport there is not the excellent subsurface control that is available for the main part of the city. Yet there is little to suggest the presence of permafrost. Peat cover is generally absent and the sands and gravels support jackpine, birch, poplar and alder, usually in dense stands but also scattered. These trees do not preclude the existence of permafrost but if it is present the permafrost table would be at a deep level (Brown 1974, p. 7).

Permafrost was not noted in any of the drill logs, in the sand pit, nor in either of the gravel pits. Although the drill holes are shallow (<10 m), the base of the presently operated gravel pit is about 20 m below the original ground surface. Brown (1967b, p. 34) cautions that "well drained coarse grained soils may be in a perennially frozen condition but the absence of ice belies the existence of temperatures below 32°F." This does not seem to be the case in the airport area, as many of the bore hole logs indicate the presence of free water. Finally, there is no permafrost to 15 m at Brown's (1973) beach ridge site, immediately east of the airport. The depth of frost penetration at the beach ridge site is about 9 m (Brown, 1973), values for less gravelly sites are in the 2 - 3 m range.

CONTROLS

As mentioned previously, the maximum permafrost thickness at the Giant Mine is 85 m, at a site where there is an overburden cover of 18 m (Bateman, 1949). It is instructive to calculate the mean annual surface temperature required to sustain such a thickness. Following the approach of Gold and Lachenbruch (1973, p. 10) the terrestrial heat flow at the Giant site can be calculated by:

$q = K.G$ [1]

where q = heat flow in mWm^{-2}

K = thermal conductivity in $Wm^{-1}K^{-1}$

G = the geothermal gradient in $°C\ km^{-1}$

Using a value for K of 2.72, $Wm^{-1}K^{-1}$ for the greenstones (Brown, 1973a) and for G of 16°C (Espley, 1961; Judge, 1973), the heat flow is 44 mWm^{-2}. This is a minimum figure in that the thermal conductivity value is a minimum, as frozen water content and temperature corrections were not taken into account.

To establish an equilibrium gradient for the overburden, a thermal conductivity value for the ice-rich silty clays is needed. Slusarchuk and Watson (1975) measured thermal conductivities of undisturbed ice-rich permafrost samples (9% sand, 55% silt, 36% clay). Taking their maximum value (from their sample with the lowest ice content) of 2.3 $Wm^{-1}K^{-1}$ (p. 418, Table I) and using equation [1] to solve for G, we get an equilibrium gradient of 19°C km^{-1}. Because the heat flow value is a minimum, and as it would be expected that the greater percentage of clays in the overburden would result in a slightly lower thermal conductivity, this gradient is a minimum.

Thus for the bedrock segment of the profile, starting at 0°C at the 85 m level, the temperature at the bedrock-overburden boundary can be estimated by using the 16°C km^{-1} geothermal gradient. This is calculated to be -1.1°C. Similarly, using the gradient determined for the overburden, the decrease in temperature over the remaining 18 m is 0.3°C (a minimum, inasmuch as the geothermal gradient is a minimum). The mean annual ground surface temperature then, must be -1.4°C or colder to maintain the permafrost thickness of 85 m.

There are only two permafrost sites in Yellowknife where ground temperature measurements have been taken for longer than one year: Brown's (1973a) spruce peatland and sedge peatland sites, where measurements were taken over a two-year period. The mean annual ground temperatures at 1.5 m are -1.8°C and -0.4°C at the spruce peatland and sedge peatland sites respectively. It should be noted that at the spruce site, above the 7.5 m level there is an increase in the geothermal gradient, which, at such a shallow level, may merely be the result of slightly cooler conditions during the year the measurements were made. If we extrapolate the gradient below 7.5 m to the 1.5 m level, we get a surface boundary temperature of -1.2°C, possibly a more realistic value than - 1.8°C.

Therefore, although the evidence is far from

conclusive, and in the absence of more ground temperature data yielding surface temperature values colder than -1.4°C, it is not impossible that at the 85 m level the permafrost is relic.

Working from the surface downwards, the mean annual ground temperature at 15 m is -0.5°C at the spruce peatland site and -0.2°C at the sedge peatland site. Using only the minimum geothermal gradient of 16°C km^{-1}, the one more favourable to thicker permafrost, the maximum depth of permafrost under equilibrium conditions at the spruce site is 46 m and at the sedge site, 27 m.

Bateman (1949, p. 11) concludes that permafrost at Giant must have extended to greater depths than at present. The process whereby the geothermal gradient reasserts itself under a warmer surface boundary condition (eg. Lachenbruch, 1968) may be going on at the present time and the base of the permafrost may be rising.

As noted in an earlier section, bedrock is frozen only where there is an overburden cover. Further, Bateman (1949, p. 11) stresses that there is a direct relationship between permafrost and overburden thickness; that a modest increase in overburden thickness results in a substantial lowering of the base of the permafrost. He deduces that the overburden has served to insulate and preserve permafrost not in equilibrium with present conditions; the thicker the overburden, the more effective the insulation and the deeper the maximum level of permafrost. To this control, which may be considered to act in a passive manner, we may add an active control in which the relationship between overburden thickness and depth of permafrost is a function of distance from bedrock exposures (Fig. IX-7).

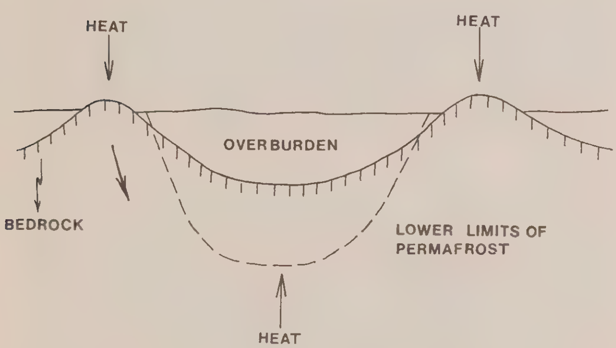


Figure IX-7: Bedrock, overburden and lower limit of permafrost (schematic, no scale, liberally modified after Bateman, 1949, Fig. 2).

The increase in overburden thickness away from bedrock exposures is simply the product of the infilling of steep sided, glacially scoured, bedrock floored valleys. The increase in the maximum depth of permafrost is the result of increased distance from excellent sources of heat, namely the bedrock exposures. The greenstones have a positive mean annual surface temperature (Brown, 1973a), being much better heat conductors than the sediments, and being of dark colour, are good absorbers of solar radiation. In addition to summer heat transfer during the spring and fall, when snowcover is patchy on the steep sided outcrops, even though air temperatures may be below freezing, direct insulation on the low albedo rock surfaces permits heat transfer to deeper levels.

The present permafrost configuration appears to be the product of upward decay, ultimately controlled by increases in the surface boundary temperatures, and lateral decay, controlled by the lateral variations in the surface boundary temperatures.

In Yellowknife, as elsewhere (eg. Brown, 1967b, 1975) textural considerations alone do not fully account for the distribution of permafrost, i.e. although silts and clays are generally frozen, sands and gravels may either be frozen or unfrozen.

It is tempting to relate the presence of permafrost, albeit sporadic, in the sands and gravels of the downtown area and the absence of permafrost in the airport sands and gravels as a function of the difference in geothermal gradient between the granites and granodiorites and the greenstones, inasmuch as the contact (as shown in Fig. IX-I, after Jolliffe, 1942 and Henderson and Brown, 1966) runs north-northwest through the tip of Kam Lake, along the southwestern edge of Frame Lake and west of Stock Lake, with granites and granodiorites to the west underlying the airport, and greenstones on the east, underlying the main part of the city. Unfortunately, it is the granites and not the greenstones that have the lower geothermal gradient (12°C km^{-1} for the granites vs. 16°C km^{-1} for the greenstones, Espley, 1969; Judge, 1973) which, other things being equal, would result in thicker permafrost at the airport relative to the downtown area.

Brown and Williams (1972) conclude that due to its unusual thermal properties, peat exerts an influence over the ground temperature regime out of proportion to the amounts in which it may be present. Brown (eg. 1966) writes that peat serves to protect the ground from the summer heat yet to encourage heat loss during the winter. During the summer, when evaporation is high, the surface layers dry out and the peat has a low thermal conductivity thus insulating the underlying soil. In the fall, when evaporation rates decrease, the peat gains moisture which when frozen during the winter months, provides a high thermal conductivity and enhanced heat loss.

Tables IX-I, II, III and IV represent an attempt to evaluate the effect of the presence and thickness of a peat cover and the relationship between peat cover and the type of underlying sediment.

TABLE IX-I: Number of Holes With or Without Permafrost and Peat Thickness; all Sediment Types Combined

	Permafrost	No Permafrost
Peat ≥ 0.3 m	157	46
Peat < 0.3 m	115	221

TABLE IX-II: Number of Holes With or Without Permafrost, Peat ≥ 0.3 m and Sediment Type

	Permafrost	No Permafrost
Sand and/or Gravel	19	2
Mixed Sand and Mud	7	3
Silt and/or Clay	131	41

TABLE IX-III: Number of Holes With or Without Permafrost, Peat <0.3 m and Sediment Type

	Permafrost	No Permafrost
Sand and/or Gravel	68	147
Mixed Sand and Mud	15	23
Silt and/or Clay	32	51

TABLE IX-IV: % Holes with Permafrost, Peat Thickness and Sediment Type

	Sand and/or Gravel	Mixed Sand & Mud	Silt and/or Clay	Combined
Peat ≥ 0.3m	91%	70%	76%	77%
Peat < 0.3m	32%	40%	39%	34%

The approach is admittedly simplistic, as are the interpretations that follow; microterrain and microclimatic conditions such as variations in snow cover are not taken into account (eg. Brown and Williams, 1972, p. 20 conclude that snow cover is as equally important as peat in determining seasonal heat flow and depth of freezing) and suffers from all sorts of statistical deficiencies, not the least of which is the uneven spread of data points. Therefore, the results are, at best, semiquantitative. Shallow holes neither reaching permafrost nor bedrock, and those for which peat or permafrost conditions were uncertain were not used in the tabulation. Muskeg as used in the 1945-46 drilling is interpreted to mean peat. A peat thickness of 0.3 m was selected as the pivotal value because where peat is present in the sands and gravels of the downtown area this is the average thickness.

With a peat cover less than 0.3 m thick there is a dramatic decrease in the number of holes with permafrost. For example, for sands and gravels, where peat is 0.3 m or more thick permafrost is present in 91% of the holes, but where the peat is less than 0.3 m thick permafrost is present in only 32% (Table IX-II). Furthermore, from Tables IX-II and III, only 21 of the 236 holes drilled in sands and/or gravels, or 9%, have a peat thickness of greater than or equal to 0.3 m versus 172 of the 255 drilled in silts and clays (68%).

These two observations offer an interpretation for the distribution of permafrost in Yellowknife: that distribution is controlled by the distribution of peat which is in turn controlled, but only in part, by the distribution of the sediment types. As mentioned previously, a peat cover is absent in the vicinity of the airport. It is likely that due to a relatively elevated position, the highly permeable sands and gravels drained freely, inhibiting the development of a peatland which in turn enhanced the degradation of previously existing permafrost and discouraged the aggradation of new permafrost. The somewhat lower downtown sands and gravels would have been sufficiently well drained to prohibit large scale peatland development, but not to prevent the growth of bogs in isolated depressions. Such bogs would, by virtue of the greater permeability of the underlying sands and gravels, be but poorly formed or formed at a later time than those in areas dominated by silts and clays, thus accounting for the fact that the peat cover in the sands and gravels is rarely as much as 0.3 m. In the areas dominated by silts and clays, where drainage would have been poor, peat evolution would have been promoted as would have the aggradation and preservation of permafrost.

Although other factors such as snowcover, vegetation and microrelief undoubtably played important roles, the development of peat is interpreted here to have been a critical control on the growth and development of permafrost. Grain size is believed to be important, but in an indirect way, in that it is one of the factors which controlled the distribution of peat.

One example to the contrary is the northeast trending belt of permafrost in sands east of the promontory on the east shore of Frame Lake. This is a well drained site lacking a peat cover which in 1945 supported widely scattered jackpine, birch and spruce. Perhaps the absence of a thick snowpack was the major control at this site. Winds, especially from the northeast, would have limited the accumulation of snow, resulting in an enhanced ground heat loss.

One control not yet mentioned is the thermal influence of surface bodies of water. As documented by Johnston and Brown (1964), Brown *et al.* (1964), Smith (1976) and others, in permafrost regions, a thaw zone exists underneath even small shallow bodies of water that do not freeze to the bottom during the winter. Roy *et al.* (1972-73) note that beneath Pud Lake, used by the Con Mine as a tailings disposal site such a zone is present. Relatively deep (10 - 30 m) holes drilled in Old Town near the shore of Yellowknife Bay reveal a thaw zone to bedrock below about the 5 m level. There is no permafrost in a hole drilled immediately offshore.

AGE

Yellowknife became ice free as early as 10,000 BP or as late as 8,000 BP (Prest, 1969, Bryson *et al.* 1969) and at least part of the city area was subareally exposed prior to inundation by Glacial Lake McConnell.

The only thing to be said with any degree of confidence about the age of the permafrost is that it postdates the withdrawal of Glacial Lake McConnell and the lowering of water levels in ancestral Great Slave Lake. Radiocarbon dates (Craig, 1970) indicate that Great Slave Lake reached its present level by 2300 - 2700 BP.

Regardless of the thickness of permafrost that may have developed beneath the Laurentide ice sheet, the thermal influence of Glacial Lake McConnell would undoubtably have thawed bedrock down to at least the present maximum depth of permafrost (85 m). Judge (1978 unpublished) has calculated rates of thaw-back for the greenstones using a boundary temperature of 4°C, a rock temperature of -2°C and an ice content, to account for ice filling pore spaces and fractures, of 10%. The rates of thaw-back indicated are in the magnitude of 300 m/1000 yrs. Although we do not know the exact life span of Glacial Lake McConnell, it was probably in existence for several thousands of years, and the thaw-back rates indicate that it is unlikely that permafrost would have been preserved down to the 85 m level.

In spite of uncertainty as to the time of the onset of the postglacial Hypsithermal interval (compare McCulloch and Hopkins, 1966; Flint, 1971, p. 524; Ritchie and Hare, 1971; Delorme *et al.* 1977), the dates reported indicate that following deglaciation, Yellowknife experienced a climate warmer than that of today. The question of how much warmer is a matter for debate (eg. Mackay, 1978 vs. Delorme *et al.* 1978).

If we use the minimum increase in mean annual air temperature of 8.2°C of Delorme *et al.* (1977, p. 2043; calculated from the average mean annual air temperature determined from their site 4, 6820 ± BP, p. 2041; increases derived from older sites are higher), the mean annual air temperature at Yellowknife (presently -5.6°C, Burns, 1973) would have been 2.6°C, i.e. the city would have been well south of the limit of permafrost which at present roughly coincides with the -1°C annual air isotherm (Brown, 1967a). Thus permafrost would not have developed until the cold period which followed the Hypsithermal became firmly established. Again there is uncertainty as to the date of the beginning of this cold period. It may have started as early as 5500 BP or as late as 4000 BP (Ritchie and Hare, 1971).

If, (after Mackay, 1972, p. 238) we use the conservative estimate of an increase in the mean annual air temperature of 3°C, Yellowknife would lie in the southern part of the discontinuous permafrost zone, with a mean annual air temperature of -2.6°C. Thus isolated pockets of permafrost could have developed in peatlands shortly after the withdrawal of Glacial Lake McConnell, pockets which would have broadened and coalesced during the cold period.

In summary, permafrost in Yellowknife formed after the withdrawal of Glacial Lake McConnell, possibly as isolated pockets restricted to peatlands during the Hypsithermal interval, or entirely in the following cold period as recent as 4000 BP. Barry *et al.* (1977) tabulate the work of various authors which indicate a number of alternating warm and cold events in the last 5000 years; it is likely that permafrost in Yellowknife has undergone a complex history of growth and decay as a result of these climatic fluctuations in the not too distant past.

ENGINEERING CONSIDERATIONS

A few comments as to the geotechnical properties of the soils in Yellowknife, the construction problems that have been encountered and how the problemd are dealt with follow. Detailed accounts are beyond the scope of this report and the reader is referred to reviews such as those by Ferrians *et al.* (1969), Brown (1970), Linell and Johnston (1973; with a copious bibliography) and Laing (1974).

Probably the most serious non-permafrost related problem results from the extreme slopes of the bedrock surfaces. Depths to bedrock can increase by as much as 40 m over a horizontal distance of 85 m. Thus a detailed preliminary site investigation is essential, even in non-permafrost parts of the city, to avoid cost overruns for buildings supported by piles driven to bedrock. Piles must be firmly anchored to bedrock; in School Draw aided by permafrost degeneration, piles not properly seated may have slipped down steep bedrock surfaces resulting in foundation failures.

Where bedrock is relatively shallow, the perennially frozen sands and gravels of the main downtown area do not present serious engineering problems, although as Stanley (1965, p. 100) points out, the presence of permafrost added greatly to the cost of the Yellowknife water distribution system. The sands and gravels are thaw stable; for small buildings the settlement upon thawing is within tolerable limits although some larger structures built on sites where bedrock is relatively deep have suffered from thermal subsidence. For major structures supported by end bearing piles, where depth to bedrock is great, delineation of permafrost boundaries is necessary, even on sites with thaw stable soils, beacuse permafrost conditions can change rapidly over short distances. One major project, now under construction, suffered considerable cost overruns when holes for piles were prebored in what was believed to be cohesive frozen sands; permafrost was absent in some of the holes and the cohesionless sands sloughed in. Where the sands contain significant amounts of mud, differential frost heave problems have been encountered.

As expected, it is the ice rich silts and clays that pose the most serious construction problems. Performance in areas dominated by ice rich silts and clays has improved somewhat since Yellowknife's inauspicious introduction to southern styled houses with full concrete basements and standard furnace heating systems. In the late 1930's the Hudson's Bay Company constructed such a house for its post manager in what is now Old Town. As related by Legget (1966, p. 4) "The post manager who occupied the new house was the envy of all his colleagues in the North. His heating system worked splendidly. Toward the latter part of the first winter, however, cracks began to appear near the front steps. Next it was noticed that the house was clearly settling, but it was some time before it was finally realized that the heat loss through the basement walls and floor was gradually thawing the frozen soil with lamentable results. Initial remedial measures proved to be ineffective. Eventually the furnace had to be removed and the basement filled in." Unfortunately, failures are still commonplace. In the School Draw area, houses built in the late 1960's with full basements not insulated from the surrounding permafrost have suffered differential subsidence, and numerous water supply line breaks have been reported. In one section of the Forrest Park area, water line breaks due to permafrost degeneration are an ongoing problem.

The following case is taken from failure investigation reports prepared by geotechnical and structural engineering consultants. In 1970 a single story steel frame structure was built on a simple flat slab foundation in the area immediately northeast of Frame Lake where the upper portion of the soil profile consists of ice rich silts. By 1973 the center of the building had settled by about 50 cm and the permafrost table had dropped to at least the 3.5 m level. Because the rate of subsidence was not diminishing and the total amount of settlement that could have taken place in the future was unknown, it was recommended that the structure be abandoned and a new one built on piles founded on bedrock rather than instal relevelling facilities, the remedial measure with the lowest initial cost.

A four story apartment and office block supported by end bearing piles to bedrock was built near the site of the previous example. The following account is abstracted from consultant reports produced for the City of Yellowknife. Shortly after construction was completed in 1973, settlements beneath and adjacent to the building were observed. Since that time, the ground beneath the center of the building has subsided about 85 cm and the permafrost table has dropped to at least the 4 m level. Adjacent sidewalks, installed in 1975 have settled by between 8 and 56 cm. A boardwalk constructed in 1976 on the northeast side of the building has undergone differential settlement of between 20 and 33 cm and is now considered useless. Arcuate slump-like extension fractures can be traced for about 4 m away from the western margins of the

building in an asphalt paved parking area. The main fuel oil supply line leading from tanks buried at the rear of the building ruptured shortly after construction was completed and oil seeped into the crawl space at the base of the building. Numerous service line breaks, both in the connections to the building and in the mains adjacent to the site have been reported. Water, from line breaks and surface drainage from adjacent higher ground, seeped into the crawl space and in December, 1977 about 30% of the building area was found to be covered by as much as 30 cm of water.

Although the water accumulation may have enhanced the rate of permafrost degradation, the ultimate cause was determined to be the high year round temperatures (eg. 10°C during October and November) in the crawl space. It was estimated that in the absence of remedial measures in the next 10 years the thaw depth would increase to about 8.5 m and an additional thaw settlement of up to 60 cm could be anticipated.

It was recommended that the underside of the ground floor be insulated and a forced draft ventilation system be installed in the crawl space to dissipate heat losses from the building and encourage rapid cooling of the ground during the winter, sump pumps be installed and the raising of adjacent surfaces with granular fill be carried out to provide positive drainage and prevent the ponding of water, the permanent repair of sidewalks and paved surfaces be delayed until the settlements have ebbed, and temperature and settlement monitoring be carried out.

In the new Frame Lake South Subdivision, the risk of encountering thaw unstable permafrost and frost susceptible soils is high. It is recommended that individual builders ensure thorough site investigations are undertaken, and it is hoped that proper procedures are recommended and competent execution of the recommendations carried out.

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AN INVESTIGATION OF COAL EXPOSURES NEAR POND INLET, BAFFIN ISLAND

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INTRODUCTION

Interest in the economic potential and particularly the mineral potential of Arctic Canada has increased greatly during the past ten years. Coal has been exploited in a few places in the Arctic Islands, but only for local use. Knowledge of the coal resources is limited but their nearness to ocean shipping routes suggests they could become valuable additions to Canada's energy supplies.

Coal seams in sediments of the Salmon River Basin, west of Pond Inlet on North Baffin Island (Figs. X-1, 2) are exposed along the coastline and in river-cuts. The coal seams may be continuous and could be of considerable value as they are near the Mary River iron deposits.

Mesozoic sediments underlie the Salmon River Basin, the southeastern extremity of the Eclipse Trough (Jackson *et al.*, 1975). The coal bearing beds lie directly on rocks of the Canadian Shield and may represent an outlier of the predominantly non-marine Isachsen Formation which is traceable from Banks Island to Axel Heiberg Island, in the Western Archipeligo. The coal is slaking, non-coking and sub-bituminous (Thorsteinsson and Tozer, 1970). Several sites have been mined for local use, but when oil was introduced for heating, mining was abandoned.

Stratigraphic analyses in the Pond Inlet Area has been restricted to the evaluation of the various coal

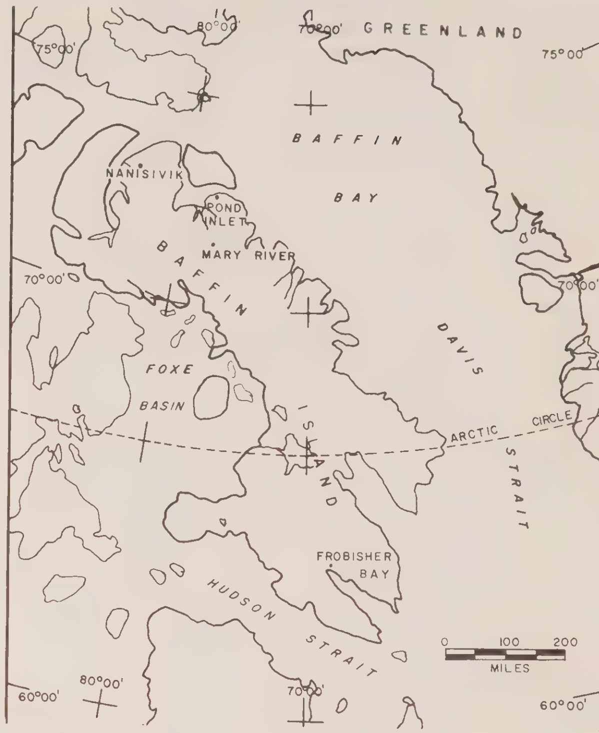

Figure X-1: Index map, Baffin Island.

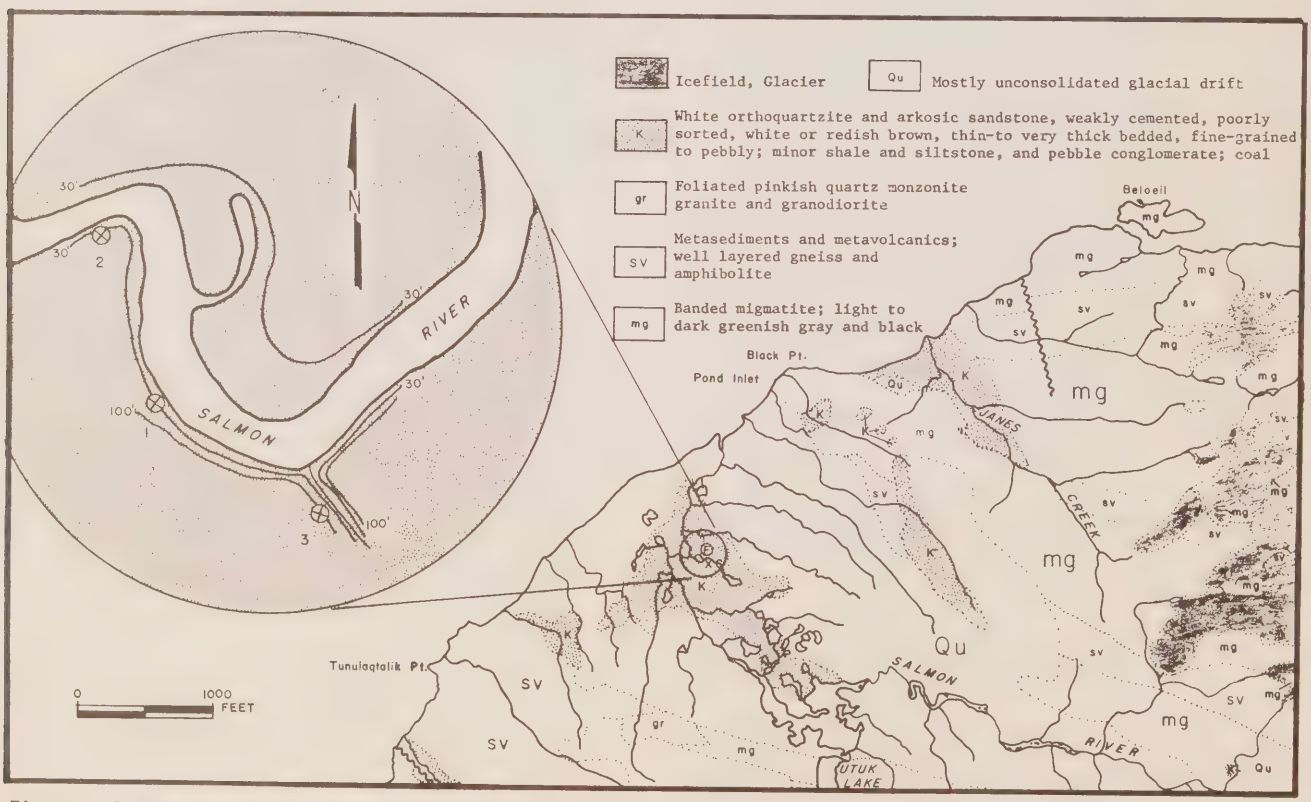

Figure X-2: Geology of the Pond Inlet area and of the site of the coal investigation reported here.

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DESCRIPTION OF THREE SECTIONS MEASURED ON THE SALMON RIVER

Section 1 - 9 samples

Height	Description
49.4 - 53.4	- clayey soil
47.7 - 49.4	- shaly, black coal
45.3 - 47.7	- semi-consolidated, buff sand
40.0 - 45.3	- shaly, black coal
35.0 - 40.0	- semi-consolidated, buff sand
34.7 - 35.0	- sand balls or
31.2 - 34.7	- shaly, black coal concretions
21.0 - 31.2	- consolidated sand with coal
15.0 - 21.0	-semi-consolidated sand with coal
8.8 - 15.0	- shaly, black coal
3.4 - 8.8	- semi-consolidated sand with coal
1.6 - 3.4	- semi-consolidated sand with coal
0.0 - 1.6	- blocky, black coal

- datum is the water level

Section 2 - 7 samples

Height	Description
32.0 - 35.0	- clayey soil
21.0 - 32.0	- powdery black coal with harder coal
20.0 - 21.0	- buff sand with mudballs and stringers of coal
13.3 - 20.0	- semi-consolidated, buff sand
10.0 - 13.3	- shaly, black coal
9.0 - 10.0	- mudballs or sand concretions
8.0 - 9.0	- shaly black coal
0.0 - 8.0	- talus

- datum is the river level

Section 3

Height	Description
103.0 - 107.0	- slump (clayey)
100.0 - 103.0	- shaly coal
97.0 - 100.0	- unconsolidated buff sand
95.0 - 97.0	- shaly coal
92.0 - 95.0	- sand with coal
91.0 - 92.0	- shaly coal
81.0 - 91.0	- sand with coal
80.0 - 81.0	- shaly coal
60.0 - 80.0	- sand with coal
40.0 - 60.0	- sand with coal
20.0 - 40.0	- coarse, yellow sand
3.0 - 20.0	- talus
0.0 - 3.0	- buff sandstone

- datum is the river level

9 samples were taken at 10 foot intervals

All measurements in feet

seams for their economic potential. The purpose of this investigation is to precisely describe the exposed sections and their related samples. A recent account of the Salmon River coal site is given by D. Bisset (1967).

Although the coal was known as early as 1911 to Janes, second officer on the Bernier (1909) Expedition (personal communication - Father Rousseliere, Pond Inlet, and Weeks, 1925, p. 139c) documentation was by Weeks (1925) who noted two seams each of 3.5 feet total thickness separated by about 18 feet of sandstone in a 100-foot cliff. As the lowermost seam is close to the water level, it is covered during high water periods and was not described. The two seams are 15 and 25 feet above the river level. When visited in 1972, the situation was significantly different, possibly because of changes in the river's course or banks. A coal seam at the top of the cliff had been worked by the R.C.M.P., by the Catholic Mission, and by the Hudson's Bay Company, as late as 1959.

FIELD WORK

A reconnaissance was made on July 15, 1972 to establish a summer route and to estimate the travel time required because mining had been done only in the winter. It took three hours in an all-terrain vehicle to reach the site. A difficult fording of the Salmon River, which was at bank-full stage was made, but because of the danger involved, it was decided to work only on the south side of the river and hence all sections measured are from that side.

On July 17th, the writer returned to the work site with five assistants, including Anaviapak who had been foreman over the coal mining in the area. Ropes were tied to the all-terrain vehicle and suspended

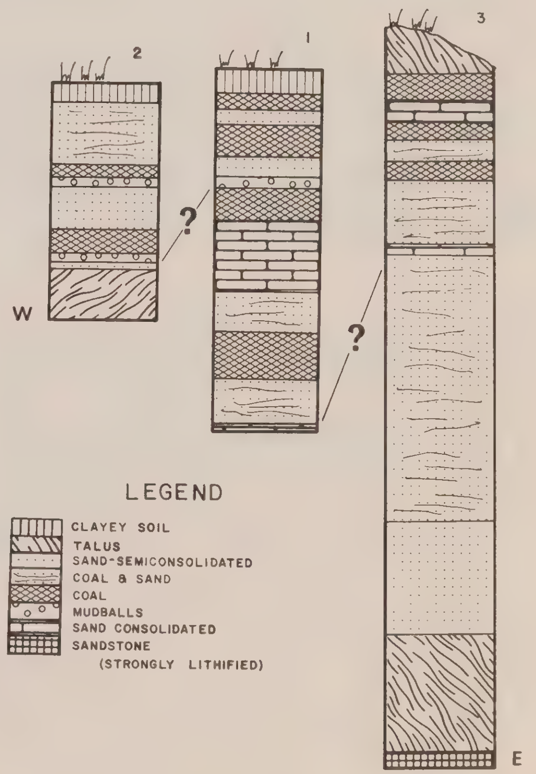

Figure X-3: Stratigraphic columns of sections measured on the Salmon River, Pond Inlet, N.W.T.

over the sections to be measured. Permafrost was encountered within a few inches of the surface of the first sections making it impossible to collect unweathered samples. The samples were wet and some were frozen and consisted mainly of fissile shaly coal and consolidated and semi-consolidated sands. Samples were collected from each distinct lithologic unit in the three sections investigated.

SUMMARY DESCRIPTION OF SECTIONS

Three sections (Fig. X-3) were measured, sampled and described. These represent a continuous 3,600-foot long exposure of the strata. The sequence dips 10° to the southwest.

Weathered sand is buff, white and yellow. The sands show well developed festoon and planar type cross-bedding. There are layers of blue blocky coal and fissile brown coal alternating cyclically with sand. Ovoid to spherical concretions of dark brown to tan coarse sand are enclosed in a finer sand matrix. Concretions found in the river bed are crumbly and encrusted with a bluish-white mineral having an acrid taste. This may be a potassium salt. The layer containing the concretions is a good marker bed. Detailed descriptions of the sections are given in the Table. Figure X-3 shows the lateral variations of the layers and suggests a correlation of the coal sequence.

CONCLUSIONS

Further study is needed to fully understand the stratigraphy and interpret the environment of deposition and the sequence of periodically recurring layers of coal and sand broken by a concretionary layer. The sand is predominantly unconsolidated and the coal may have a different nature to that reported by Thorsteinsson and Tozer (1970, p.589).

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NATIONAL TOPOGRAPHIC SYSTEM INDEX OF COMPANIES

INDEX

Géologie de surface et pergélisol
Surficial Geology and Permafrost

Yellowknife, N.W.T. (T.N.-O.)